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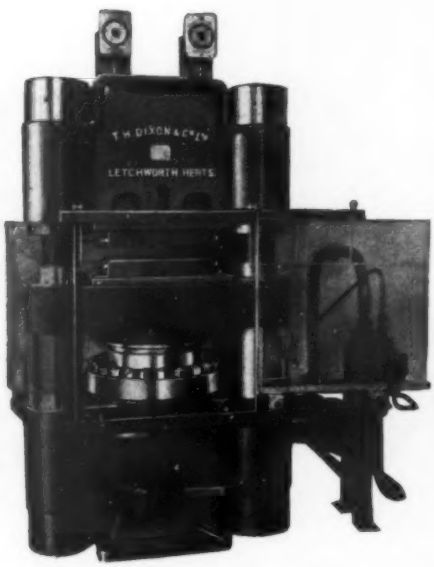

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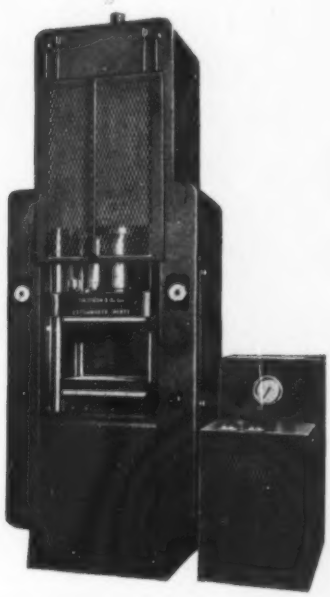

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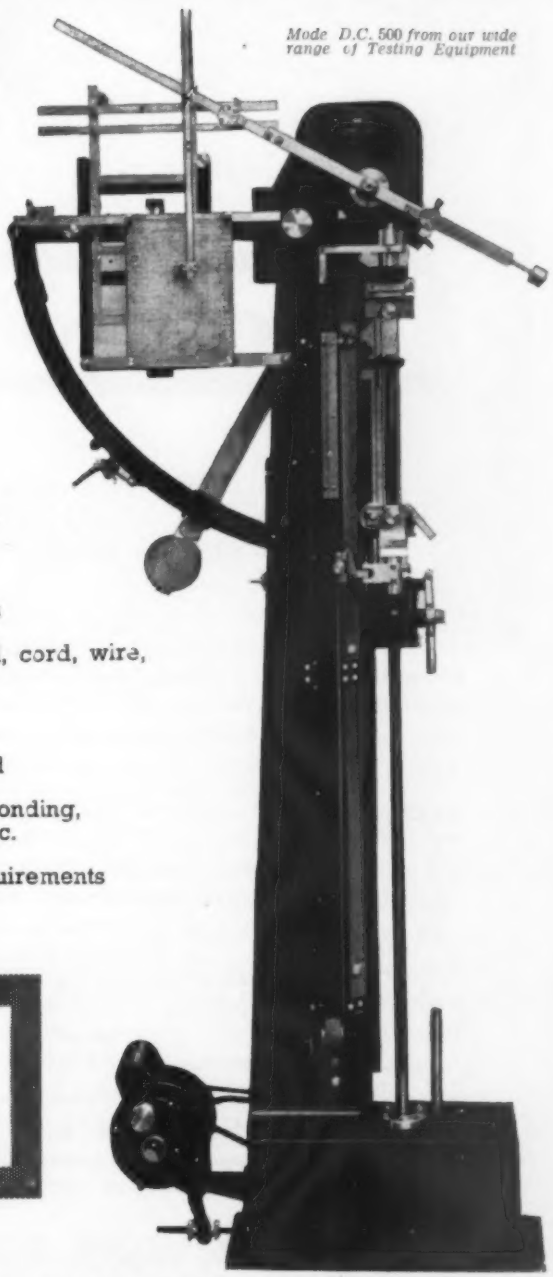

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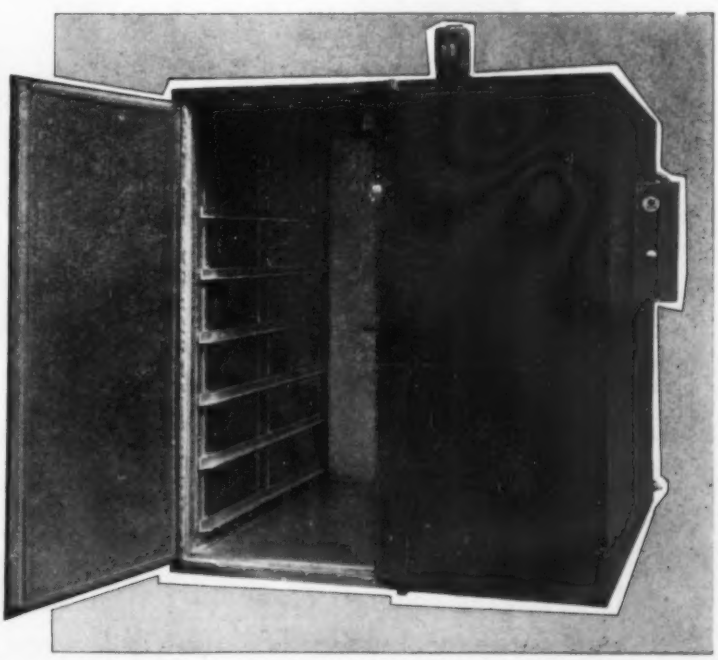

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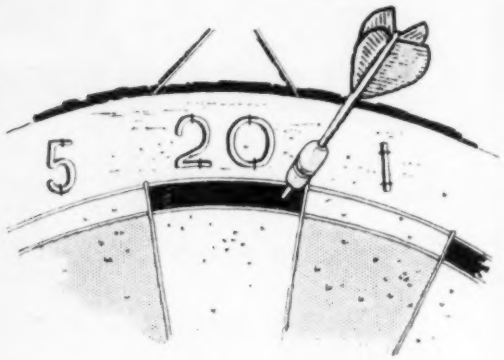

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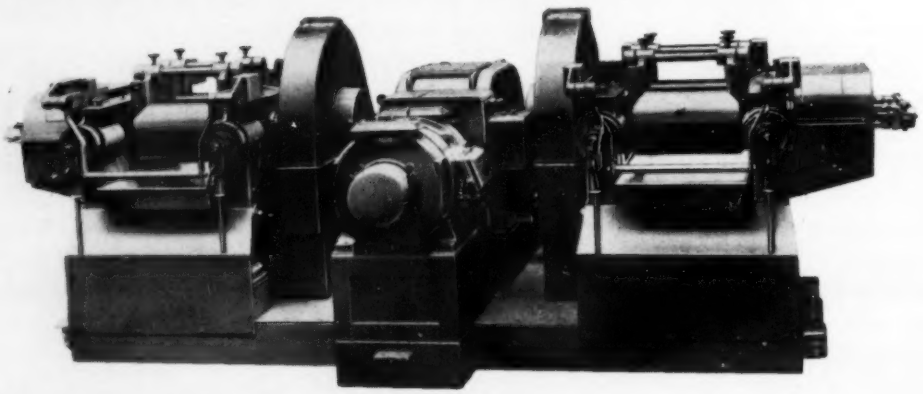

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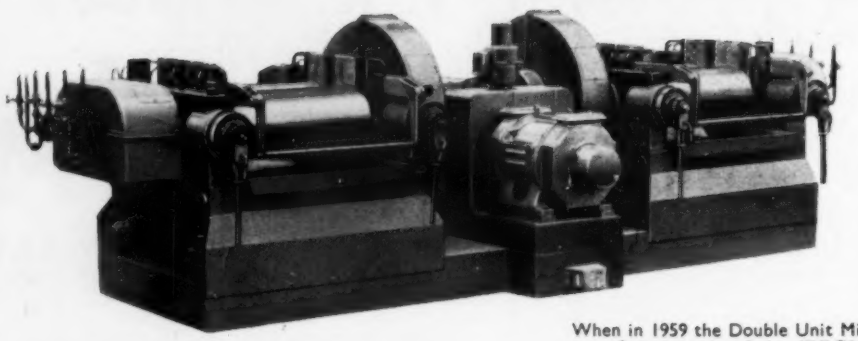

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August 27 1960

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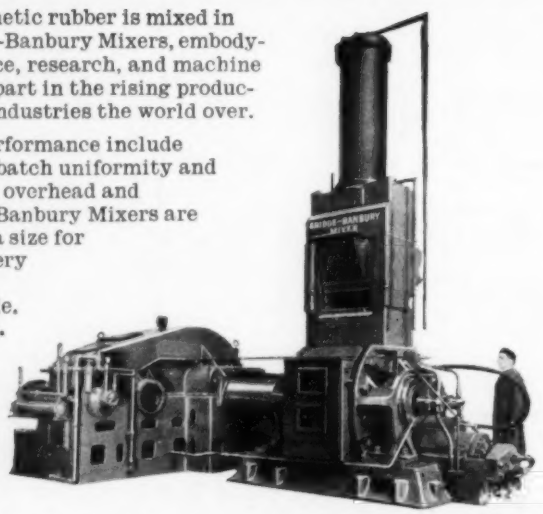

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NOTES of the WEEK

The Unskilled

MOST of the UK working population are not properly trained for their jobs. For a country that depends on the efficiency of its industry—which in turn depends on well trained and adaptable workpeople—this is a ludicrous position. The situation is crystallized in a booklet which was published on Tuesday by the Industrial Training Council called *Training Boys in Industry—The Non-Apprentice.*

While progress has been made since the war in the development of apprenticeship training, non-apprentices have been neglected. And yet these people—the so-called 'semi-skilled' and the unskilled workers—make up two-thirds of the working population. Far too much training is haphazard, on the job stuff; in fact, a good many get to know how to do a job in spite of the training they're given. Now the Council has reached the important conclusion that systematic training is essential for all boys entering industry, in whatever capacity they are immediately employed.

A growing number of firms are recognizing this problem, and in the booklet certain principles are laid down as an approach to tackling it. Among the firms quoted is Goodyear, who have been running a youth training scheme at Wolverhampton since 1946. The scheme, a three-year one, involves day release, detailed reports and possible entry to a further scheme. It works: the company says that it produces men who are capable of accepting responsibility. It incorporates what the Industrial Training Council believes are two essential elements in any new approach to the problem: planned practical training in the workplace and further education.

This training problem, always serious, is becoming more and more urgent as the 'bulge' moves out of the schools and into industry. Tackling it, and bearing the initial costs now, will pay big dividends in the long run.

The First Plastic

'A NEW material and manufacture now exhibited for the first time, has from its valuable properties induced the Inventor to Patent the discovery in England and France, and to devote his attention for the last ten years to the development of the capabilities and application of this beautiful substance to the Arts'.

The 'beautiful substance' was Parkesine, which Alexander Parkes made by mixing nitrocellulose with camphor and alcohol, and the quotation is from his introduction to it at the International Exhibition in London in 1862. Parkesine has been described as the first synthetic plastic, and the forerunner of celluloid, and the Plastics Institute is now planning to celebrate its centenary.

Looking back over the development of the plastics industry, we can see how commercial exploitation has lagged behind discovery. It was not until 54 years after Parkesine was first exhibited that the first phenolic moulding powder (Bakelite) was formed and the industry really began to get underway. Many of the materials we use today were discovered in the 19th century but were shelved as being only of theoretical interest. In the 1840's Regnault noted carefully that a white condensation product was formed when vinyl chloride in a sealed tube was exposed to sunlight, but it was not until after World War I that pvc was developed. In 1831 the Swedish chemist Berthelot obtained styrene by the thermal decomposition of ethylbenzene —a method which is now used commercially.

On The Shelf

WHEN it was first shown, Parkesine was regarded by most of the Victorians in their ordered, natural world, as a mere curiosity. But Parkes seemed to recognize its importance. In the catalogue he wrote: 'In the Case are illustrations of the numerous purposes for which it may be applied, such as Medallions, Salvers, Hollow Ware, Tubes, Buttons, Combs, Knife Handles, Pierced and Fret Work, etc. . . . these have been produced solely by the Exhibitor (as Samples), not having yet arranged a systematic manufacture for the material.' (How many plastics manufacturers since have had to say the same thing?). 'It can be made Hard as Ivory,' he goes on, 'of any degree of Flexibility . . . may be of the most Brilliant Colours, can be used in the Solid, Plastic or Fluid State, may be Worked in Dies and Pressure as Metals, may be Cast or used as a Coating . . . can be spread or worked in a similar manner to India Rubber . . .'

Put into modern idiom, this would read almost like a brochure from a present-day raw material manufacturer: Parkes seems to have had a glimpse of the future. When we celebrate the centenary of Parkesine, perhaps we should also wonder what beautiful substances have been discovered and are now waiting, on the shelf, for their commercial development.

NEWS *Briefs*

POLISH PLASTICS FOR YUGOSLAVIA — TYRE CORD BATTLE — DRACONE FOR CANADA — US INTEREST IN DUTCH FILM CONCERN — JAPAN PVC FIBRE

●**Holland** — The Pennsalt Chemical Corporation of Philadelphia, is to acquire a substantial interest in N.V. Fabriek van Chemische Producten at Vondelingenplaat, near Rotterdam. This company manufactures plastic films and various other products. Pennsalt's production range — which includes organic sulphur compounds, rubber chemicals and fluorene-based plastics — is complementary to that of the Dutch company's.

●**Canada** — Mansfield Rubber (Canada Ltd. has completed plans and started construction on expansion of its plant, at Barrie, Ontario. Building expansion of approximately 30,000 sq. ft. marks the second extension since the company started manufacturing tyres in Barrie just over five years ago.

●**Belgium** — Cape Asbestos Company announces the formation of a Belgian company, Appareillage Technique et Industriel S.A., which has acquired the business of that name. The factory and head office are in Brussels.

●**Nigeria** — The Western Nigeria Government is to spend £100,000 on a Rubber Research Institute for the mid-west.

●**Holland** — The capital investment involved in the phenol plant which is to be built at Botlek (*RJIP* April 23, 606) is estimated at 40 million guilders. The facility will be jointly owned by Staatsmijnen in Limburg and Dow Chemie A.G. Part of the phenol will be used in nylon manufacture in Limburg, and part will be marketed by Dow in Europe.

●**United Kingdom** — The formal offer by F. Francis and Sons (Holdings) for the capital of Lacrinoid Products (*RJIP*, August 20, 288) has now been posted to shareholders. The directors, it is reported, are accepting the offer.

●**Canada** — Imperial Oil will this autumn bring into use a 10,000 gallon 100ft. Dracone towing barge for the transport of oil to the island of Grand Manan, in the Bay of Fundy, from St. John (New Brunswick), 55 miles away. This UK product is made by Dracone Developments from nylon cloth proofed with neoprene.

●**Japan** — Japan Synthetic Rubber Co. Ltd. recently reduced the price of SBR by 6%. This is the first reduction since manufacture in Japan commenced and was necessary to compete with imported materials.

●**Ceylon** — A Chinese delegation is expected to arrive in Ceylon at the end of September. Discussions will be held on the renewal of the rubber/rice barter agreement.

●**Sweden** — Viskafors Gummifabrik AB is to double its tyre production. The concern is to invest Kr.7m. in a new factory adjoining the existing plant.

●**Poland** — The first Polish exports of polyester have been sent to Yugoslavia. Further exports, both of the standard and the highly-processed polyester, are planned for the second half of this year.

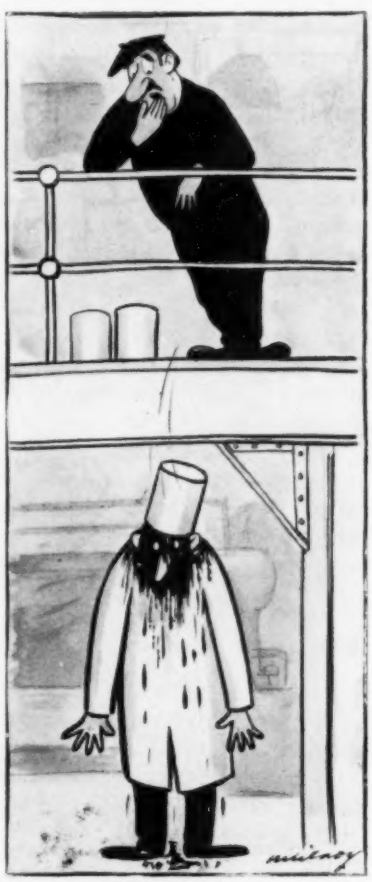
●**Japan** — Sekisui Chemical Co. Ltd. has recently completed a new factory for the production of plastics materials for the building industry. Another plant is under construction which will make butyral resins and plasticizers.

●**Japan** — Teikoku Rayon and Kureha Chemical companies claim to have produced, by joint research, a polyvinyl chloride fibre which has higher heat resisting properties than other conventional PVC fibres. The new fibre, which has been named Tevilon, is not expected to be in commercial production for some time.

●**Brazil** — The new plant inaugurated in March by B. F. Goodrich do Brasil S.A. is now turning out 700 tyres a day. 60% of raw material being used is of Brazilian manufacture. The plant will be expanded in 1961.

●**United Kingdom** — Dunlop's four-man team for Donald Campbell's world land-speed record attempt at Bonneville Salt Flats, USA, flew from London Airport on Wednesday. Five years' research and development have gone into producing tyres and wheels for Bluebird. The Dunlop team will keep a close watch on the performance of tyres and wheels throughout the timed runs.

●**United States** — Du Pont has announced a nylon price cut of two to five cents per lb., the third reduction in a year and the latest manoeuvre in the nylon-rayon battle for domination of the multi-million dollar-a-year tyre cord market. Du Pont said its price cuts were made in response to recent price cutting by rayon tyre cord producers. Chemstrand Corp. of New York, another large nylon producer, said it was following the Du Pont price move and Allied Chemical Corp. has made a similar announcement.



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I.C.I. in Eastern Europe

MORE POLYTHENE TALKS FORECAST

TALKS between Imperial Chemical Industries and a consortium of four eastern European countries on buying I.C.I.'s know-how on polythene production, are likely to be resumed soon, according to an account in *The Times* on Monday.

The four countries involved are Poland, East Germany, Czechoslovakia and Rumania. Talks held three months ago between an I.C.I. delegation led by S. P. Chambers, chairman of the company, and Government representatives were adjourned so that the representatives could report back.

Reasons for Delay

The account puts a finger on several reasons for delay: not the least of which is said to be the question of how, and how much I.C.I. will be paid. Other questions to be settled are whether I.C.I. will provide consultants and service engineers, and whether equipment needed would be supplied by the group of manufacturers who built I.C.I.'s complex at Wilton.

If the talks are brought to a satisfactory conclusion then the four countries will set up their own polythene plants.

I.C.I. produces about 100,000 tons of polythene a year in the UK — a capacity which is due to be extended — and also produces through subsidiary companies in Canada, India and Australia.

As far as Western Europe is concerned the company announced in March this year that it has formed a joint concern with a Danish firm to manufacture polythene in Denmark. Called Danbritkem A/S, this company has a capital investment of £4m. and will produce 15,000 tons of polythene a year.

Last year I.C.I. negotiated Terylene polyester fibre contracts with eastern European countries, including an £8m. contract with Poland.

Plast-Teknik

The Swedish Plastics Federation is to hold a conference on plastics technology — 'Plast - Teknik 1960' — from November 21-23 at the Hotel Gillet, Stockholm.

There are to be 50 to 55 papers, each delivered in the original language. There are also to be discussions on European integration and the effect of the European Economic Community and the European Free Trade Association.

Big German Investment in India

A chemical complex in India which will number among its products plastics raw materials is to be built by a group of four West German companies.

The four companies — Bayer, BASF, Hoechst and Friedrich Uhde are said to have signed an agreement with the Indian Government last week.

The complex, which will be sited near Bombay, will represent a capital investment of about £3m.

Union Carbide's London address from August 27 will be 8 Grafton Street, W.1 (Tel. May 8100).

Plastics Chemical Plant Agreement

Matthew and Yates, fan engineers of Swinton, Manchester, have made a joint agreement with Turner and Brown to manufacture a wide range of plastic chemical plant. It is said that this tie-up will mean that the organization will be the biggest of its kind in the UK.

Turner and Brown at the moment supply industry with PVC fans.

The equipment will be manufactured under the trade name Turbo-Cyclone; Matthews and Yates will combine their 80 years' experience in engineering with Turner and Brown's technical knowledge of plastics fabrication.

PI Awards

The Council of the Plastics Institute has awarded fellowships to D. K. Baird and P. H. Choudhury. New A.P.I.s are B. H. Gregory, M. G. Harwood, D. C. E. Hickman, A. Hourd, J. A. Rogers and (by exemption) J. Gadsby.

Diplomas have gone to A. J. Davenport and R. W. Little.

Swinburne Medal Awarded

The Council of the Plastics Institute has made the first award of the Swinburne Medal to Professor G. Gee, C.B.E., F.R.S., for his outstanding contributions to the advancement of polymer chemistry.

Professor Gee, who is Professor of Chemistry at Manchester University, will deliver his Swinburne address at the Royal Institution on Thursday February 16 1961 at 6.30 p.m., when he will be presented with the gold medal and the sum of money which accompanies the award.

The award was instituted in 1959 to commemorate Sir James Swinburne, F.R.S., who died aged 100 in the previous year; it has been endowed by Bakelite Ltd.

In constructing the £3m. Walton South reservoir at Walton-on-Thames, 3¼ miles of Fablon 1,000-gauge polythene film is being used. Up the side of the vast bowl of the reservoir a bulldozer pushes ballast on to the film, which is laid over the perimeter clay. The film is used both to keep the moisture in the clay and the ballast away from it

Molecular Weight of Carbochain Polymers

AS A FUNCTION OF THE DEGREE OF DISPERSITY RESULTING FROM MECHANICAL COMMINUTION*

SUMMARY

Powdered vibrodispersion products of polystyrene and polymethyl methacrylate are separated into fractions of varying dispersity. Viscometric molecular weight determinations reveal the existence of a correlation between the molecular weight and the particle dispersity.

IN the mechanical comminution of polymers which are in a vitrified state free macroradicals are formed at the cleavage sites on the particles on the newly formed surfaces. The stabilization of these free macroradicals as a result of interaction with acceptors contained in the surrounding medium (oxygen) or in the polymer itself (stabilizers, remains of initiators, admixtures, etc.) leads to the formation of products of mechanical destruction — stable fragments broken off from the molecular chains of the polymer on each newly-formed surface. Accordingly as the dispersity increases, and corresponding to the development of the specific surface, there takes place an accumulation of the products of mechanical destruction. The amount of these products must in general be proportional to the dispersity reached in the crushing, if our original assumption of preferential destruction on the cleavage planes is correct. The general effect of reduction in molecular weight during the crushing of polymers has been the subject of a whole series of investigations[6-8] and is not open to doubt.

Interest attaches also to the establishment of a connexion between the dispersity of the particles and the average molecular weight for polymers which are in the vitrified state, since this makes it possible to confirm or reject the assumption of preferential localization of the acts of 'mechano-cracking,' and in addition, to draw a number of applied conclusions. The products of destruction are distinguishable not only by the lower molecular weight but also by the presence of new functional groups formed at the ends of the chain fragments on their stabilization, the nature of these groups being determined by the nature of the acceptor. This circumstance may lead to certain qualitative differences in the physico-mechanical properties of the products of destruction, *e.g.* in their solubility, as compared with the properties of the original polymer[9-11]. Consequently, with insoluble polymers there may become evident a partial solubility as a result of the accumulation of products of destruction[12-15]. There is in the literature no work dealing with a direct establishment of a connexion between the molecular weight and the dispersity in the crushing of polymers, but there is a communication in which a similar connexion is established indirectly namely from the increase in the proportion of soluble fractions in comminution. The actual purpose of the present work was the establishment of a clear functional relationship between the dispersity and the average value of the molecular weight in the comminution of amorphous carbo-chain polymers. The objects under investigation were specimens of commercial emulsion polystyrene and block polymerization polymethyl methacrylate. From the original material films were cast, and after complete evaporation in air at room temperature, these were subjected to a preliminary coarse comminution. The polymer specimens thus prepared were comminuted further in a M-10 vibromill, the polystyrene after freezing in liquid nitrogen and the polymethyl methacrylate at 20 to 30°. The duration of the comminution was 10 to 12 min. The comminuted polymers were fractionated by particle size, for which purpose the grinding products were first passed through a system of metal sieves. The unfractionated last fraction, with the highest dispersity, was subjected to sedimentation fractionation in a jet of dry nitrogen. The average particle diameter of each fraction was determined by microscopic measurement. The molecular weight of the fractions was determined viscometrically; for the polymethyl methacrylate calculations were made of the mean weight value of the molecular weight while for the polystyrene we restricted ourselves to determination of the specific viscosity of a 0.5% solution in benzene. The experimental dependence of the molecular weight upon the dispersity for these polymers is shown in Figs. 1 and 2. As may be seen from these figures, there is indeed a clear typical functional relationship $M = f(S)$ determining the alteration in the molecular weight of amorphous polymers in mechanical comminution. The continuation of the curve in the direction of lower dispersity corresponds to the low dispersity at which the molecular weight of the integral polymer and of the particles is practically identical. The further course of the curve in the direction of higher dispersity is less well defined, although it is of great theoretical interest. Along the axis M, or η as the case may be, we must ultimately come to a point corresponding to M_∞[14] or to the equivalent value of

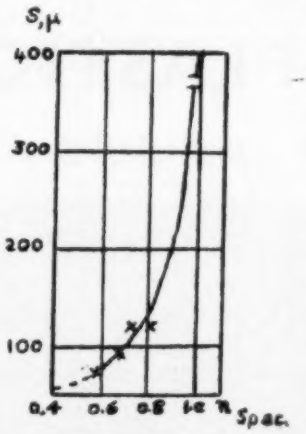

Fig. 1.—Alteration in the specific viscosity of solutions of polystyrene as a function of the particle size reached in comminution

* *N. K. Baramboim and V. N. Gorodilov (Vys. Soed., 1960, 2, No. 2, 197-9), RABRM. Translation by R. J. Moseley.*

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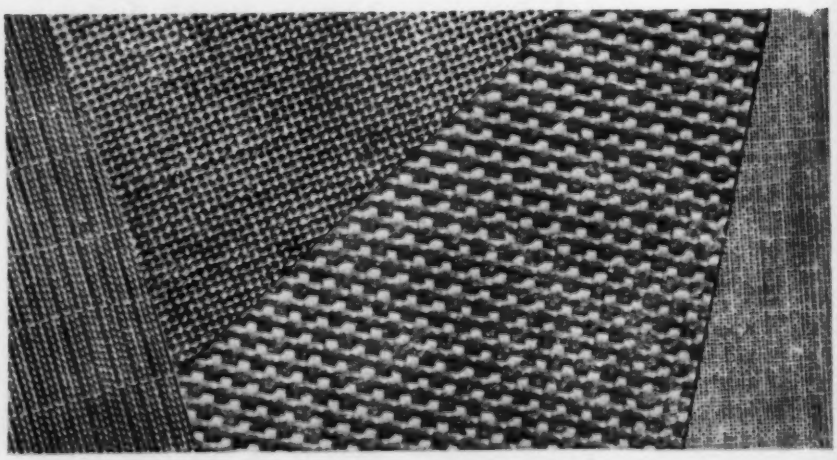

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specific viscosity. Along the axis S we must ultimately reach a dispersity corresponding to the molecular dimensions of a fragment M∞, but in practice this is impossible. In point of fact, in the comminution of polymers in a gaseous medium, on

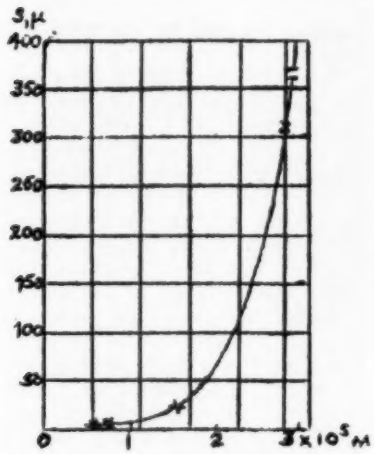

Fig. 2.—Alteration in the molecular weight of polymethyl methacrylate as a function of the particle size reached in comminution

reaching a definite degree of dispersity further grinding leads in practice to a fall in M without alteration in S. This comes about because the submicroscopic particles which are formed cohere anew and form aggregates, and the highest practically obtainable dispersity will be determined by the chemical nature of the polymer — its autohesive properties under the given conditions.

The relationship presented in Figs. 1 and 2 will, of course, alter somewhat with alteration in the specific conditions of mechanical dispersion such as temperature, frequency of the mechanical action, the medium and so on. Nevertheless this dependence, once established experimentally in given certain specific conditions, is of great practical significance. In the first place, if there is a need for mechanical comminution of a polymer and at the same time there is stipulated a lower limit of molecular weight, which is still permissible with the manufacturing requirements, then from the curve we can establish with great accuracy the ultimate permissible degree of comminution, beyond which there results a deterioration in the technological properties of the polymer. In the second place, if for technological considerations it is necessary to lower the molecular weight of the polymer, in order for instance to raise the solubility, to reduce the viscosity of the solutions, to facilitate moulding and so on, then from the curve we can find the dispersity of the fractions, the continuous selection of these in the process of dispersion facilitating the production of a uniform product with the stipulated properties.

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Asbestos Road

An experimental 'asbestos road' is being put down at Thetford Mines, Quebec — centre of the world's asbestos supply.

Engineers of Asbestos Corporation, together with a local firm of asphalt contractors, are laying over 100 yards of road in which the asphalt is spiked with 2% of short-length asbestos fibre.

Similar tests in other parts of Canada and the USA claim to show that this mix helps make the road surface tougher and more resilient and reduces upkeep costs.

US Meetings

Divisional meetings of the USA Society of the Plastics Industry to be held in the next few months include the following: September 11 - 13, Vinyl Film Manufacturers at Absecon, NJ; September 28-30, Thermoplastics Pipe Division at Dearborn, Mich.; October 2-4, Cellular Plastics at Wernersville, Penna.; October 23-25, Fluorocarbons at Hot Springs, Va.

Michelin introduce a new size in their 'X'Y range for on- and off-the-road conditions. The 7.00-20 'X'Y tyre is now being produced for on- and off-the-road use on 2-4 ton vehicles. Its cost is £19 10s. and its carrying capacity is 26½cwt.

The Italian company of Snia Viscosa has withdrawn from the Rhodesian Cellulose Development Company, a Government-backed organization.

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Early Knowledge of Rubber

PART 1 — THE LATEX ENIGMA

By H. SCHURER, Ph.D., F.L.A.

IT has often been remarked what a long way rubber has had to travel from the date of its discovery—practically coincident with the discovery of America—and its integration into the material civilization of Western Europe. The same statement applies to latex, only with even greater force. For dozens of authors of whom we have records showing that they have seen primitive rubber articles or who repeat such tales from hearsay, over a period of 250 years there are only two investigators of whom we know that they had actually seen a rubber tree; the Spanish physician Francisco Hernandez in the 16th, and the French colonial civil servant François Fresneau in the first half of the 18th century. While with Fresneau and his sponsor La Condamine, the first phase of modern rubber knowledge opens, as far as the knowledge of latex goes, the second half of the 18th century, altogether a fruitful pioneer period, presents a paradoxical picture. Instead of enlarging the understanding of the substance, the odd properties of latex puzzled observers at this period to such an extent that between 1750 and 1790 what little was known was more confused and less accurate than what most of the naive authors of travellers' tales of the preceding centuries had known. This is indeed a surprising state of affairs, and the main features of the picture deserve a brief delineation, especially as some interesting documents have only come to light in recent years.

Two Schools of Thought

From the very beginning of descriptions of rubber there have been two interpretations of the metamorphosis by means of which a white liquid turned into a brown elastic solid substance. The first theory ascribes this change to evaporation; exposure to air dries the substance and rids it of its moisture content. Heat treatment by a human agency, or deliberate exposure to the sun speeds up the process. This was the explanation which suggested itself at first, and indeed the very first reference to rubber yet traced, dating from the first half of the 16th century, gives this interpretation of the metamorphosis of latex into rubber. To quote the English translation of 1612 of Peter Martyr's *De Novo Orbe*, 'This juice they boil, which being hardened by heat, converts into a massy substance.'[1]

Parallel With Milk and Blood

Surprisingly enough, the majority of the old authors offer a different and more accurate interpretation. The term they use for the metamorphosis, puts the process clearly into a parallel with phenomena taking place in liquids such as milk and blood. As early as 1552 the secretary of Cortez, Francisco Lopez de Gomara, in his book on the conquest of Mexico, uses the old Castilian word *quaxar* (in modern Spanish *cuajar*) for the process, which is usually translated as 'to curdle.'[2] Alonso de Zorita, in his 'History of Mexico,' written about 1584[3], Antonio de Herrera Tordesillas in his great book on Spanish achievements overseas published 1601[4], and Juan de Torquemada in his *Monarchia Indiana*, published in 1615, all use this term[5]. Else they have nothing much to say concerning latex except that they all notice the change of colour from milky white to brown during the solidification process. The one and only author in this group who really adds something to these statements is Bernabe Cobo who wrote an important 'History of the New World' in 1653 which, however, remained unpublished till the end of the 19th century. In this passage, which is of great historical interest for the early knowledge of rubber, Cobo writes concerning the milky sap of the rubber tree, *cauchuc:*

'It gradually turns yellow and finally black, but with the difference that when it is left in a vessel, it remains liquid a long time, yet when anything is smeared with it, it curdles quickly and turns black. To test this transformation, I had a tree tapped in Nicaragua and with the juice which had run out I washed my hands. Although my hands remained white at first, with one hour the sap had congealed and had turned black, so that my hands appeared to be covered with a pair of black gloves.'[6]

Fresneau's Search for the Rubber Tree

Turning from Latin America and the Spanish discovery of rubber to French Guiana in the 1740s, we find the colonial civil servant F. Fresneau completely starting from scratch in his investigations of rubber. He had encountered only articles made from the substance and he thought at first, as a letter written in 1746 shows, that rubber was a mixture of substances.[7] While his interest in the substance grew, he gradually became convinced that rubber was really nothing but the product of a solidification process of a milky sap, a fact which he had doubted for quite a while.[8] In this moment his attention was drawn to a book published in Paris in 1745 which described La Condamine's celebrated journey from Ecuador to French Guiana along the Amazon valley. In this book was a reference to an elastic resin which was obviously the same substance as the material of the elastic articles Fresneau had become fascinated by[9]. While there was no discussion whatsoever of latex, the passage, of course, was of considerable interest to Fresneau.

In 1747 Fresneau set out on his expedition in the hope of finding the tree that yielded the elastic resin described by La Condamine on French colonial soil. He was successful, found the tree, drew illustrations of it, and collected information on the primitive rubber technology of the natives.

Fresneau was the first man to have looked at rubber with the eyes of a scientist. When returning in a boat from the spot where he had discovered the rubber tree of French Guiana, he had taken good care to bring back with him a container filled with latex. That was in October 1747. Only in 1763 was he to report an observation of interest to the knowledge of latex made then, and even then his observation remained unpublished and forgotten. Fresneau's few lines got nearer to the nature of latex than any previous observer had recorded so far; it can be called the first scientific approach to latex science.

Fresneau's Observations on Latex

He had put the latex—in all likelihood *Hevea brasiliensis* latex—into a well stoppered bottle and examined

the latex three days later, on his return to Cayenne. A serous part had separated from a milky part, the milky part floating on top. In stationary conditions, Fresneau assumed, the milky part would have assumed a shape following the lines of the square bottle, but owing to the movement of the boat, the shape of the milky part had become that of a truncated pyramid. Owing to a long dry spell, the milk proportion of the contents of the bottle was abnormally low, only about a nineteenth of the whole amount. As the bottle had only been a third full, no other agent could have affected the latex but the air inside the bottle. Thus, Fresneau concluded, it was due entirely to the action of the air, that the separation of the latex into a serous and a milky portion had taken place. With its attempts at quantitative measurements of the proportions of the two portions and its conclusions concerning the effect of air on latex, this observation of Fresneau's was the most serious contribution to latex science yet made since the date of the discovery of America. Yet, alas, only in 1942 has Fresneau's observation come to light.[10]

Fresneau's and La Condamine's Conflicting Views

Fresneau, on his return to France, soon after his expedition, was anxious to put the information on the rubber tree of French Guiana and his conceptions of a utilization of the elastic resin as a valuable new colonial raw material before a scientific audience. La Condamine whom he had met in French Guiana was the obvious choice to present an interesting paper on a new—perhaps potentially useful—tree of a French colony to the French Academy of Science. La Condamine was interested in giving Fresneau a helping hand, as, when rummaging through his papers for additional notes on the elastic resin briefly referred to in his travel account along the Amazon valley, he had come across the fact that in 1736, soon after his arrival in Ecuador, he had despatched some samples of rubber—rolls of *Castilloa elastica* rubber — to the Academy together with a covering note. It was perfectly natural that La Condamine was anxious to establish the fact that in reality he had been the first in the field of rubber discovery and he was genuinely convinced that what he had discovered in Ecuador and in the Amazon valley had more or less been followed up by Fresneau in French Guiana.

In this letter of 1736 which La Condamine read as part of his introductory remarks when presenting Fresneau's paper to the Academy of Sciences in 1751, he had given rather a different explanation of the solidification process of rubber than that advanced by the old Spanish writers of whose accounts he was naturally completely unaware. In 1736 La Condamine had written ' In the forest of the Esmeraldas province grows a tree called by the natives Hhe'v'e. . . . By a mere incision a white milky resin flows from it; it is received at the foot of the tree on leaves specially put there. Then it is spread out in the sun where the resin hardens, and gets brown, first on the outside and then inside."[11] Thus, La Condamine in his letter of 1736 envisaged the solidification process as induced by heat treatment, as a shedding of moisture by evaporation.

Triumph of the Evaporation Theory

Whether or not there was any discussion between Fresneau and La Condamine on this point before Fresneau drafted his paper to be edited and read by La Condamine, it is impossible to state at this distance of time. We have Fresneau's report, in the unedited as well as in the edited form, and neither of these versions refers to the observation Fresneau had made on his bottle of latex on his return from his expedition to the virgin forests of French Guiana. In the report Fresneau submitted for public reading and subsequent publication, he had said hardly anything about the latex, but described the methods of primitive rubber technology in which treatment by smoking and heating indeed played a part. Fresneau had summed up that in his opinion ' rubber was a resinous oil, condensed and freed of its serous part which evaporates on exposure to heat treatment by smoke which it undergoes when worked by the natives."[12] It was perfectly natural that the impression any reader of the paper as published in the Transactions of the Academy would receive was that rubber resulted as a product of a solidification process caused by drying, or, in more scientific terminology, as a result of evaporation. La Condamine's letter of 1736 and Fresneau's conclusions both pointed to the same interpretation of this characteristic metamorphosis. Whether mere exposure to air or heat treatment, evaporation was the explanation of the process. The far more complex state of affairs indicated by Fresneau's observation of 1747 remained unknown.

In 1765, the first article on rubber in a contemporary encyclopaedia

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makes it quite clear that a mere process of evaporation was assumed to account for the transformation of latex into rubber.[13] The great French statesman, Turgot, in his highly interesting reflections on the potentialities of rubber drafted in 1769 ascribes the metamorphosis to heat treatment pure and simple.[14] The first monograph on rubber, a Dutch doctoral dissertation written in Latin by A. Juliaans in 1780, declares that latex becomes inspissated when exposed to the sun[15] and a widely used standard textbook of 1790 by a leading French scientist, Chaptal, interprets the turning of latex into rubber as entirely due to heat treatment.[16] One author of a widely used reference book, was obviously impressed by the remarkable speed with which the 'drying and thickening process' proceeded once the sap left the tree. He thought that rubber technology should be developed only in the countries where the trees grew, for this very reason. Only the countries blessed with this treasury of rubber trees could be expected to build up any rubber industry, and the products would be their exclusive goods available for export. As the author, Valmont de Bomare, was widely quoted, he can be regarded as the champion of the 'quick evaporation' theory.[17]

Delaborde Adds to the Confusion

In 1772, a colonial physician in French Guiana, Dr Delaborde, was sent to explore the local flora. His report on the rubber tree of French Guiana appeared in 1773 in an important French scientific journal recently founded.[18] Whether he really saw the tree and observed primitive rubber technology on the spot, remains extremely doubtful, yet he made his contribution. He suggested that after tapping the rubber trees, the natives added a vital ingredient to the latex of which they made a profound secret, and only after that drying and thickening of the latex took place. This new idea, for which Dr Delaborde must be held responsible, added a new source of confusion. When going through the encyclopaedias and reference books of the period, two rival theories are put forward to explain the metamorphosis of latex, the 'quick evaporation' theory of Valmont de Bomare put forward in his edition of 1775 and the 'secret compounding ingredient' theory of that villain of the piece, Dr Delaborde. The compilers enumerate both theories, naturally lacking the data to choose between either of them. Such is the case in well-known English encyclopaedias such as G. S. Howard's *New Royal Cyclopaedia* of 1788[19], E. Chambers's *Cyclopaedia* of 1791[20], and even as late as 1815 C. H. Kauffman in his *Dictionary of Merchandise*, which John Keats once got as a school prize, puts forward these rival explanations.[21] Such was the authority of a report which appeared to come first hand from the spot and so plausible was the explanation of a secret ingredient for a highly puzzling process that Valmont de Bomare, in his next edition of 1791 modified his statements of 1775 and expressed the hope that it would be possible to get the secret of the mysterious ingredient out of the Indians.[22]

Tribulations of Latex Transport to Europe

In the questionnaire addressed to Fresneau at the end of 1762, the first question had been whether it would be possible to convey latex from America to France and then work it on French soil in the same manner as it was worked in its country of origin. Fresneau had been somewhat non-committal in his reply. He had emphasized the absolute necessity to have the containers hermetically sealed, but as to practical suggestions for keeping the latex liquid, he had made a rash analogy with certain procedures then used in contemporary surgery and of all substances, he suggested as the ideal stabilizer — lemon juice![23] It is not surprising that there appears to have been no practical sequel to this suggestion, but surprisingly enough, as early as 1768 we find Sir John Banks, the future president of the Royal Society, as a purchaser of a container of latex bought from a London merchant. After having been bought, presumably at a staggering price, the latex quickly decomposed. Brazil was then part of the Portuguese Empire, and it was from Lisbon that Banks' bottle of latex had come.[24] A French scientist stated in 1791, that despite considerable efforts and the offer of the exorbitant sum of 50 louisdors for another bottle, Banks never succeeded in obtaining another sample.[25] The same French author, Grossart, in the same passage, relates the sad tale that latex samples had been despatched to French scientists from French Guiana or from Mauritius — then a French possession — where the rubber of *Landolphia* had been reported in 1769—but all these samples had arrived in a state of decomposition. He, Grossart, had kept such a sample of decomposed latex in an unheated room for several years, but after the vigorous cold

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spell of the winter 1788/1789 he had found the bottle burst, and presented the observation for what it was worth. So far people like Aublet in 1762, Puget d'Orval and C. Richard in 1785, had studied rubber trees on the spot in French Guiana and Brazil, but the knowledge of latex had not been advanced by their investigations as far as they were published, valuable as their contributions had been otherwise. It was due to the lucky chance of a few samples of latex arriving in France in an undecomposed state that latex science took its first step.

Fourcroy and Vauquelin

The second important factor for this first step was the great revolution in the basic conceptions of chemical science associated with the name of Lavoisier. The first great rubber chemist had been Macquer, his successor in his chair was Fourcroy; and Fourcroy and Vauquelin, his close collaborator in many investigations, can be termed the first latex chemists. In 1786 Fourcroy adopted the new doctrines of Lavoisier with their emphasis on air being a mixture of oxygen and nitrogen and the importance of the oxygen component in many acids. By applying these newly accepted concepts to the study of latex Fourcroy and Vauquelin brought off a veritable triumph of 18th century chemistry. In standard histories, the work is ascribed to Fourcroy alone, but contemporary accounts leave no doubt that it was a joint investigation by Fourcroy and Vauquelin, while it was left to Fourcroy as the senior partner of the team to read the report to the Society of Agriculture in 1790.[26] This paper appeared in print in 1791.[27]

Fourcroy related that since 1780 he had been asking to be supplied with latex samples, and at last, in 1784, he had received a small quantity from Réunion, presumably *Landolphia* latex. In July 1790 the Society of Agriculture had received a sample, presumably from America, and he assumed it was *Hevea guianensis* latex, but as at the time nobody was clear about the tree of origin, we may assume it was *Hevea* latex. He noticed that exposition to air, not heat treatment, was the cause of the metamorphosis and for the first time he left no doubt that the solidification of rubber was a coagulation process. The confusion existing since La Condamine had read his old letter of 1736 to the Academy of Sciences in 1751 and to which Delaborde had added additional false clues, was at last cleared up by Fourcroy. It was the action of the oxygen in the air—note the utilization of the Lavoisier concepts — which brought about the separation between serum and what we would call the rubber hydrocarbon, the rubber floating on the top. As the oxygen was a component in all acids according to Lavoisier's theory, it was not surprising that the separation of the latex into a serum and a hydrocarbon component was effected by the action of acids on the latex, even more quickly than by the action of the air. Thus, by the utilization of the Lavoisier conceptual framework, Fourcroy was in a position to give a theoretically satisfying interpretation of the coagulation process. Fourcroy also noted the important fact that alkalis had the opposite effect to acids on the latex, they opposed separation and effected a stronger bond between serum and rubber hydrocarbon. Unfortunately he went out of his way to emphasize the potentialities of caustic alkalis for the stabilization of latex, an unfortunate suggestion which undermined other people's confidence in the soundness of his results.

(To be continued)

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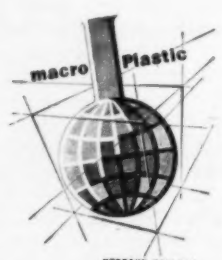


NEWS ABOUT MACROPLASTIC

●At the MacroPlastic Exhibition at Utrecht (October 19-26), several Dutch shipyards will exhibit boats of polyester and glass fibre, and reinforced polyester sandwich construction.

●Polyvinyl acetate, hitherto imported from UK will be manufactured in Holland by the Strucol Fabrieken (N. V. Kleefstoffenfabriek Gebr. Struyk) under licence from Revertex Ltd.

●G. Dikkers and Co. will display 'Dihalite' products. This is an epoxy based material used for bearings which, due to the incorporation of graphite, is classed as self-lubricating.

●A film known as 'Benefol Gitterplastic' for use in the building industry will be displayed on the stand of G. van Loon's Import Mij. N.V. The material consists of a net of rayon, polyamide or polyester fibre embedded in PVC.

●British firms exhibiting or represented in the Margriethall (machinery hall) include BIP, R. H. Windsor, and Peco.

●Owens-Corning Fibreglas Corporation represented by Firma Weber will display products for plastics reinforcement, decorative fabrics, floor and wall coverings, aircraft interior upholstery and electrical insulation. Also included in their display will be a number of finished products of glass reinforced plastics such as sailing boats, bows and arrows, fishing rods and helmets.

The next Mechanical Handling Exhibition — the world's largest display of all classes of industrial labour-saving and ancillary equipment — is to be held at Earls Court, London, from May 8-18 1962.

Living with Plastics

STOREYS EXHIBITION OPENS IN LONDON

THE first public exhibition devoted entirely to the use of plastics in the home is now on show in London, at the Tea Centre, Regent Street. It was opened on Monday by C. H. Glassey, president of the British Plastics Federation.

The exhibition has been designed by Arnold Rattenbury, and is sponsored by Storeys of Lancaster, with co-operation from raw material suppliers and many makers-up. An attempt has been made to bring some of the uses of PVC film and coated fabric to the attention of the architect, the interior decorator and the general public. About 55 manufacturers are taking part in the exhibition.

Some of the products on view are still in the test stage, others are being given new and unusual uses. For example, a fabric (Norzon) originally produced for the shoe and garment trade has now been adapted and re-interpreted for use in upholstery; another intended for lamination use on radio sets or biscuit tins may be seen here as ceiling tiles.

The lay-out of the exhibition shows a series of room settings, and even includes a patio garden with lily pond made from Plastoglass — a laminate of two layers of PVC with an interlay of glass fibre mesh.

In the kitchen and bathroom, living and dining rooms, Con-Tact (and Con-Tact Extra with a special resin coat) self-adhesive PVC has been widely used on walls; recent laboratory tests show that this material may be applied to any dry, newly plastered surface. Other textured effects for wall coverings are given by Storide, a fabric backed material also used on chairs, and Stormur a recently developed fabric of bonded PVC to paper. By using various embosses and contrasting colours the designer has achieved a variety of effects in different rooms.

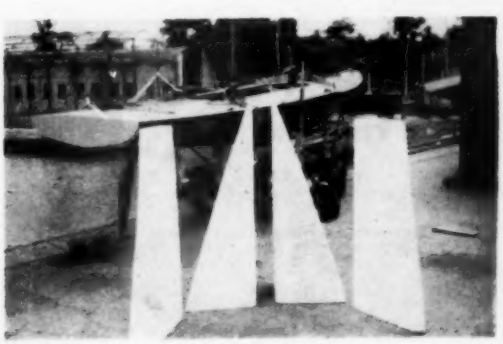
The main bedroom features Storide on a recess wall, and this is repeated in an unusual manner as drapes and quilted panels forming the wardrobe door and curtains. The Teen-age room, complete with sofa bed and chair, uses Storeys translucent curtaining pleated to make concealed light panels; there are travel goods in Plastoglass, a television set in Perspex and the new coloured gramophone records in Geon PVC.

The nursery has been made 'child proof' by using black Con-Tact as a wall surface for chalks and crayons.

The lounge is lit by a wall-to-wall Lumenated Westminster ceiling, which softens and diffuses light from fluorescent tubes above. It is based on three-foot-square modular panels of translucent PVC, resting in aluminium track which is suspended from the structural ceiling. Each panel is made up of a channel frame across which is stretched a sheet of optically correct PVC. This diffusing medium is securely locked into the frame by a PVC core. The ceiling is made by Lumenated Ceilings Ltd.

Another new effect is obtained with padded and quilted PVC panelling. The surface of this panelling — called Paniquil — is padded with polyurethane foam and backed with ¼in. flexible hardboard. The panels are cut cleanly to any shape or size and are fixed by panel pins or impact adhesives. Designs comprise large diamonds without centre studs, small diamonds and flutes in a large colour range.

The exhibition will remain open until September 22.



Tormentor Yacht Station is supplying six yachts like this to a club in Aden. Each has a glass fibre hull and the strange shapes in the foreground are new buoyancy tanks made of Marleycel expanded polystyrene

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MEN *and* MATTERS

A Review of People and Events

by Peter Richards

IT'S a shock to realize that it will soon be exhibition time once again. My feet feel tired at the thought of it. Next month will begin the season with the Finnish Plastics Exhibition on September 13 and the natural rubber research conference at Kuala Lumpur starting on September 26.

In October we shall really be in the thick of it with the international rubber conference in Berlin starting on October 4 and the international symposium on synthetic rubber, organized by our contemporary, *Rubber and Plastics Age*, opening seven days later in London. The week after, on October 19, Macro-Plastic opens in Utrecht. Then, after a month's gap, the Swedish Plastics Federation will hold its twelfth international conference on plastics technology — Plast-Teknik 1960 — in Stockholm.

J. R. Lewis has moved from Dunlop to Ekco Plastics. He has been appointed representative for South Wales and South West England

Poultry, Otorhinolaryngology, etc.

The Department of Scientific and Industrial Research produces a booklet which lists all technical and scientific conferences of this kind. Straying a little from rubber and plastics I discovered that the First European Conference of the World's Poultry Science Association is being held in Utrecht in November, and that the 'Fifth International Symposium on the Microbiology of Non-alcoholic Beverages Excluding Milk and some other Perishable Foods Packed in Hermetically Sealed Containers' will open in Evian, France.

There are symposiums on speleology, traumatology, urology, methodology, sedimentology, mycology, allergology and otorhinolaryngology. Mixed up with these are conferences on more mundane matters such as sanitation, corrugated containers and rheumatics. Then there's the 'International Symposium on Numerical Weather Prediction' to be held by the American Meteorological Association in Tokyo, November 7-13. This should be the week to book for a holiday.

Bagging, Strapping and Wrapping

There must be few exhibitions in which the polymer industry does not take part, directly or indirectly. An interesting feature of this year's corrosion and metal finishing exhibition (Olympia, November 29-December 2) will be technical meetings arranged by the Plastics Institute and by the corrosion group of the Society of Chemical Industry. This is the first time that this has been done.

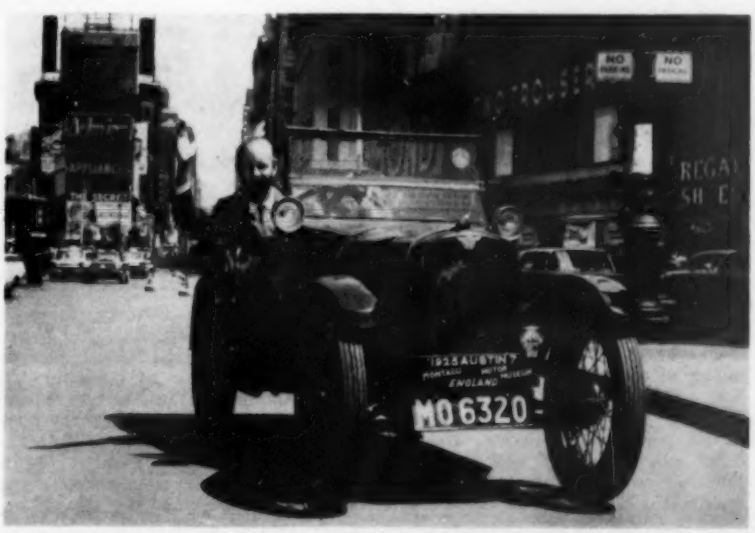
Preview reports, by the way, show that this exhibition will be at least twice as big as the first corrosion exhibition, held in 1957: it will probably be the world's largest display of metal finishing products and services.

Packaging is another field in which plastics are increasing their stake, and they should steal a good part of the limelight at the Fresh Food Packaging Exhibition (Alexandra Palace, November 1-4). Nearly a quarter of the grocery trade is now handled by 7,000 self-service and 400 supermarkets — a sphere where the pack is all important. The broiler industry which shot up last year, alone uses a million film packs every week.

Every conceivable machine applicable to this field of packaging will be on show at the exhibition: there will be machines for bagging, wrapping, sealing, strapping, pouching, vacuum packing, sleeve wrapping, grading, cutting, weighing, washing, brushing, shrink-wrapping, and stapling.

Tschiffely Rides Again

The ghost of A. F. Tschiffely must have haunted the site of the old St. James' Theatre on August 18, when a 1925 Austin 7 was presented to Lord Montagu of Beaulieu for safe keeping in the Montagu Motor Museum. This car had just been



Mr John Coleman and his 1925 Austin 7, photographed in New York at the end of his 11,000-mile drive from Buenos Aires. The route was largely the same as that taken by A. F. Tschiffely on his ride from Buenos Aires to Washington on horseback in the year in which Mr Coleman's car was manufactured. *(See 'Tschiffely Rides Again')*

brought back from New York after being driven 11,000 miles from Buenos Aires by Mr John Coleman, a 32 year-old Oxford Graduate and educational research worker. Considering its age and the state of the tracks over which it had been driven, the car is in remarkable condition, and BMC may justifiably be proud of the achievement of Mr Coleman and their car. Dunlop also, who organized the reception at which the car was handed over, have more evidence of the quality of their product, for the standard Dunlop tyres are still in fine shape and apparently good for at least another 11,000 miles.

During his trip Mr Coleman must have had many anxious moments and exciting experiences which will no doubt be mentioned in a book that he is planning to write. One of the most hair-raising incidents must have been when, as he was going up a mountain road, a prowling puma decided to investigate and peered in through the open window, but fortunately decided that the odd looking vehicle was harmless.

The idea for the trip came from the journey of A. F. Tschiffely, who in the year when Mr Coleman's car was made, rode two horses from Buenos Aires to Washington.

Tschiffely died in 1954, and it would be nice to think that perhaps he was with Mr Coleman in spirit — this may be what frightened off the puma, not, as has been suggested, Mr Coleman's beard!

New appointments have been made at Bakelite. D. S. Mahon (left) has been made manager of market research, in addition to his post as manger of the sales development department. C. T. Coward (lower left) and M. C. Dixon have been appointed assistant managers in the latter department.

Jablo in Malta

I mentioned two months ago that two plastics concerns were contemplating starting up a company in Malta (*RJIP* July 2, 22). One of the firms, it has now been announced, is Jablo Plastics, who, together with C. H. Bailey (Malta) has formed Jablo Plastics Industries (Malta) with a capital of £50,000.

Various Jablo products will be manufactured under licence — they are mainly expanded plastics used in the building, fishing, refrigeration and shipping industries.

Malta is a half-way-house between East and West and this places it in a favourable position for export to Mediterranean and African users and to the Middle and Far East at comparatively low freight rates.

The board of the new company will include Lord Selsdon (chairman of the Jablo companies) and B. Jablonsky.

Polly Ester Says . . .

'Smoked sheets—too many cigarettes in bed'

Question Corner — 132

(Second Series)

457. How is tear strength determined by the Elmendorf methods?

(Answer next week)

Answer to Question Corner — 131

456. There are two principal methods of applying rigid polyurethane foams. The first is known as the male-female method, in which one part of the mould is completely open, and the other part is lowered into place after the reaction mixture has been introduced into the female part.

An example of this method is in the production of radomes. The open part of the mould is lined on the inside with polyester laminate and placed under the male part, similarly lined on the outside. The reaction mixture is then introduced into the female part and the male part lowered until the proper thickness is obtained. The foam rises between the two polyester laminates. Improved adhesion is obtained if the surfaces of the laminate are slightly sand-blasted.

Another method involves placing a restrain pattern in position just before pouring the reaction mixture, and so it must be possible to pour through small apertures. This method is useful for potting where the reaction mixture is poured round the object (*e.g.* electrical components), and a bar is placed above to restrain the rising foam. The apertures may vary from 1in. diameter down to ¼in. diameter, and the reaction mixture must be very fluid.

There are several factors that affect the density and structure of polyurethane rigid foams. First there is the ratio of surface to volume: the higher the surface ratio, the higher the density of the foam. Thus, foaming in thin slabs usually results in higher densities.

Another factor is the material from which the mould is made. Wood, masonite, and similar materials, are of low thermal conductivity, the exothermic heat of reaction is not rapidly carried away through the walls of the mould and a more effective 'blow' is obtained. If the exotherm can be contained, lower density foams may be expected.

Heat is lost rapidly through metal moulds resulting in higher densities.

Where the mould is placed in a jig with openings for pouring in the reaction mixture, which also serve as escape holes for rising foam and displaced air, then generally the smaller the holes and total volume, the higher the foam density. In the case of a free rise lower densities may be expected.

Additional factors are water content, cure and effect of catalyst.

(Another question next week)

P.V.C.-coated 'Terylene' flexible ventilation ducting in use at Parsonage Colliery, Leigh, Lancashire

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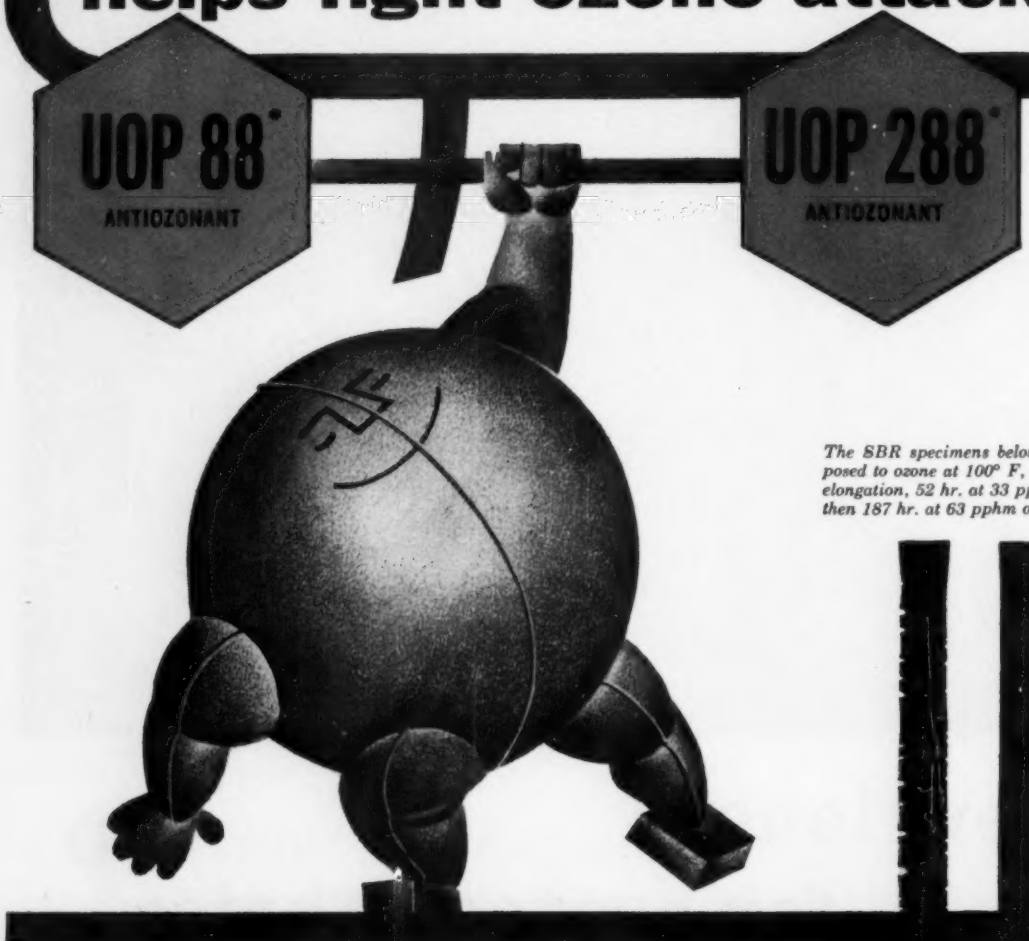
'Terylene' is the trademark for the polyester fibre made by IMPERIAL CHEMICAL INDUSTRIES LIMITED, FIBRES DIVISION, HOOKSTONE RD, HARROGATE, YORKS

what type of CARBON BLACK helps fight ozone attack?



The SBR specimens below were exposed to ozone at 100° F, 20 percent elongation, 52 hr. at 33 pphm ozone, then 187 hr. at 63 pphm ozone.

the kind you choose can be a help or a hindrance . . .

Are you aware of the extent to which some carbon blacks adversely affect the protection afforded rubber products by antiozonants?

Some inactivate much of the antiozonant added for ozone protection. Others are more compatible with the antiozonant.

The two rubber test strips shown at right are clear evidence that carbon black plays an extremely important part in obtaining maximum service life of rubber compounded with antiozonants.

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(Left) Carbon black—EPC (easy processing channel). Curing system—2 phr sulfur, 2 phr benzothiazyl disulfide. Hours to first crack—31 to 47.

(Right) Carbon black—HAF (high abrasion furnace). Curing system—2 phr sulfur, 2 phr benzothiazyl disulfide. No cracks in 200 hr.

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Jointing Plastic-Insulated Conductors in Telephone Cables

RECENT DEVELOPMENT FROM AUSTRALIA

LINEMAN Grade II N. Symons, of Mosman, Sydney, recently won a £1,000 Australian Postmaster-General Improvements Board award for an improved method of jointing plastic-covered wires, especially polythene (*RJIP* February 20, 282). His method, world patented and considered to be a major development by world standards, allows full advantage to be taken of the waterproof nature of plastic installation in communication cables.

Stripping and Twisting

When plastic cable was first used by the PMG Department, joints were made by stripping the wires, twisting them together and then insulating each wire joint with a plastic sleeve. When all the wire joints were completed the joint was closed by an overall sheath seal.

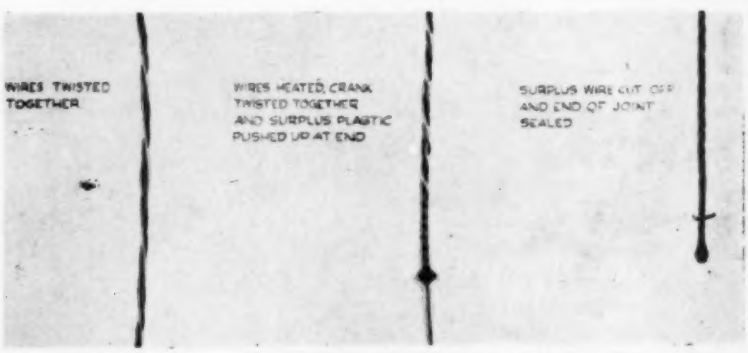
Early experience in Britain, Australia and the USA with plastic cable showed that, unlike paper-lead cables, almost all faults occurred at joints, as the plastic insulation was waterproof and faults occurred only when water contacted bared copper wire at a joint. The British Post Office, in order to prevent faults at joints, installed internal seals at the ends of plastic cables entering a joint. This resulted in the entire joint area being dry, but two difficult sealing operations being required, the water barrier and the sheath seal.

The US method consisted of preventing water from reaching each individual wire joint itself by placing over it a special plastic sleeve, filled with silicone grease.

For plastic-to-plastic joints the wire joint seal is favoured since, with water barriers, faults can still occur if the sheath seal fails, and experience with all kinds of sheath sealing techniques has been unsatisfactory both in Australia and abroad. Nor are the existing methods of installing water barriers completely satisfactory

Before Symons invented his 'Hot Twist,' the only manner in which wire could be sealed was to use grease-filled sleeves. However, this was unsatisfactory for a variety of reasons: the sleeves could become dislodged; they were rather expensive; different sizes had to be stocked for different conductor sizes; grease could be squeezed out of the sleeves; and soldering of the wire joints was necessary owing to possible high-resistance trouble caused by harmful effects of the grease on the copper.

Efforts were therefore made to develop a better sealed wire joint and in 1956 a research engineer of the Minnesota Mining and Manufacturing Company developed a special sleeve to seal and insulate effectively wire joints in plastic communication cables (Scotchlok Type T). However, it was a complicated arrangement of plastic and metal sleeves into which the unstripped wire was placed, and the sleeve was crimped with a pneumatically operated crimping tool; an obviously costly system.


WIRES TWISTED TOGETHER
WIRES HEATED, CRANK TWISTED TOGETHER AND SURPLUS PLASTIC PUSHED UP AT END
SURPLUS WIRE CUT OFF AND END OF JOINT SEALED

Special Sleeves

The Bell Laboratories, USA, solved the problem for plastic-covered aerial wires by the use of special sleeves comprising an assembly of inner and outer metal sleeves with a plastic liner. The wires are stripped, then inserted into the sleeve, and the sleeve then crimped with a manually operated crimping tool. The Bell Laboratories are also working on a sealed wire joint for cable conductors, but no more is known about this project than that it aims to produce a device to strip, join and seal the conductor mechanically.

Readily Learnt

The Symons method, on the other hand, produces an effectively sealed wire joint without special sleeves of any kind, by using a technique readily learnt and only requiring a source of heat. The method consists of twisting the unstripped wires loosely together, applying heat to soften the plastic, and then twisting the wires together using a normal crank twist. The wires move through the softened plastic, making good electrical joints, while the plastic reseals itself around the wire twist. The surplus wire is then cut off but, in doing so, the plastic is pushed back over the wire twist for about half an inch, to form a blob of plastic at the end of the joint. The exposed wire ends are then sealed by heating the blob of plastic, causing it to seal itself over the end of the joint.

This method has a number of advantages: it produces a permanent waterproof seal; wire stripping, as well as soldering, become unnecessary; no special sleeves are required; the technique is soon acquired; and for polythene insulation, any source of heat may be used.

Radiant Heat

Standard acetylene torches are used, but a cigarette lighter too makes an effective joint. It is pointed out, however, that for PVC-covered wires a bare flame is unsatisfactory, and radiant heat is required.

Laboratory and field tests have proved that the method is effective, and it has now been adopted as the standard method for all plastic-to-plastic joints in the Australian Post Office.

The method is based on the discovery that heat-softened plastic insulated wires may be joined by twisting the unstripped ends together. But although quickly learnt, a few days' supervised practice is needed to eliminate errors, by testing each joint for insulation resistance and continuity.

It is anticipated that water barriers and sheath seals will only be used in future on long plastic cables and the like.

GRP Turns £100 into £400 Model

A HARTLEPOOL man, John Hawker, has built a glass fibre car for £100, which is now valued at four times as much.

The basis of the car is a 1948 5cwt. Ford van. Initially, the body was stripped off and the chassis strengthened by ¼in. x 3in. plate welded along the sides, to which three arms (on each side of the chassis) were welded to take the body. A bulkhead of blockboard covered with aluminium was bolted across the frame at the rear of the engine and floorboards fitted of ¼in. plywood and covered with glass fibre.

Old floorboards, hardboard, and plaster were used to make a mock-up on the chassis and a template of plywood was let into the plaster as part of the former, for the Austin curved screen which was fitted ultimately.

The Mould

On treating the plaster former with shellac mould release, one layer of Turner Brothers Asbestos Co.'s Duraglass 2oz. cloth was laid on tissue. Flat edges had strips of wood laid on and clothed over for strength. Immediately in front of the screen, and behind the rear of the hardtop, pieces of ¾in. tube about 8in. long were clothed up the sides and over the top, and similarly down the middle of the cab.

When the mould had hardened, a saw and hack saw was used to cut the mould completely through the glass fibre and the tubes. The front end of the plaster mould was then easy to slide off—the return curves causing no trouble. The same principle applied to the tail end and the centre portion, after being cut down the middle, was removed in two pieces.

The four parts of the mould were then assembled upside down in a cradle of scaffold poles and bolts were put through each of the two halves of tube and tightened. The mould was then complete and ready for lining but at this stage it was necessary to fill the joints and finish the entire mould with shellac.

GRP turned a 1948 5-cwt. Ford van into this sports model

The Body

After applying mould release, a layer of tissue and then cloth was put in and, although not necessary, a second layer of Duraglas cloths throughout.

It was apparent after the GRP moulding had been prepared that two old car doors should have been fitted to the original former. This would have cut out time spent on fabricating windows and so on.

Wheel arches were cut in plywood, bolted along the chassis and glass-fibred to the body.

The total cost of this vehicle was £100 but after extensive checking by the assessor of one of the large insurance companies, full comprehensive coverage was offered at £400.

The resin, catalyst and accelerator were supplied by Resinous Chemicals Ltd.

Polythene Sells Paper

Two years ago, a USA paper manufacturer changed from wrapping its loose leaf fillers with paper bands to automatic overwrapping with Union Carbide polythene film. Since the switch, production costs are down 33% and sales are up 50%.

Production now totals 4,000 gross packs per month, an increase of some 20% over the band method — necessary because of the increased demand stimulated by the new package.

Offer for Ipoh

Parsons and Co., Glasgow stockbrokers, has offered to purchase the 600,000 1s. shares in Ipoh Rubber Estates at 2s. 10¼d. per share. The bid is worth £85,625.

The offer is subject to 90% acceptance being received by September 15. The directors are recommending acceptance.

The Seventh Member

A seventh member will be added to the University of Akron's international rubber science hall of fame at the annual symposium and banquet Friday November 18.

Five individuals who made memorable contributions to the science of rubber chemistry were initiated into the hall of fame when it was established in 1958. They were: Charles Goodyear (American, 1800-1860), C. Greville Williams (English, 1829-1910), Carl O. Weber (German, 1860-1905), Henri Bouasse (French, 1866-1953) and Ivan I. Ostromislensky (Russian, 1880-1939).

Thomas Hancock (1786-1865) was added to the gallery last year.

Selection of the 1960 member will be made by a committee chaired by Dr Maurice Morton, AU Professor of Polymer Chemistry and Director of the Institute of Rubber Research.

Geon PVC-based tiles have been laid in St. Paul's Cathedral. Marley Tile Co. laid 160sq.yd. of tiles as part of recent renovations carried out in the chapel for the Order of the British Empire

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SHELL CHEMICALS

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Plumbing — Dowsing — Ale and Public Opinion

NEARLY 5,000 years ago, Egyptian nobles had luxurious baths installed in their gardens. There were baths, also, in the Aegean palaces of Knossos and Phaitos during the period 1700-1400 B.C. Yet, 3,000 years later, Queen Elizabeth I, like most of her contemporaries, could not bring herself to take more than one bath a month. Again, in the 17th century when Louis XIV built the Palace of Versailles, not an inch of plumbing was allowed to mar its ornate interior.

Like one of those notorious eleven plus examination questions—invented by people whose minds seem, at least to those of us who don't know the answers, all bitter and twisted—the bathing habits of our ancestors, not forgetting dowsers, ale and polls, appear to have nothing in common. On the face of it, there is also no obvious connexion with rubber and plastics.

In fact, however, articles on these and a multitude of different subjects have appeared in those fascinating 'by-products,' the prestige publications put out by major manufacturing companies in, among others, the rubber and plastics industry.

Lavishly illustrated, more often than not in colour, these magazines maintain very high standards of production and layout. Broadly speaking, they fall into two groups. Those, such as Imperial Chemical Industries' superlative publication *Endeavour*—in a class of its own so far as content is concerned—and the Shell Chemical Company's excellent *Catalyst*, which editorially make no mention of company products; and those which concern themselves with materials manufactured by the company. In these, the net of interest is usually spread wide and embraces every aspect from details of the garnering or manufacture of the initial raw materials to accounts of the manifold uses of the finished or semi-finished product.

The majority of the publications in this second group contain in each issue articles on 'foreign' subjects. Thus recent issues of *Monsanto Mail* have included articles on the flower growing industry of the Scilly Islands and atom power; the summer issue of

the *Esso Magazine* contains the third of a series on Education and Industry; the *Dunlop Gazette*, more in the nature of a house organ than the others, recently included an interesting article on the work of the Royal Mint, and there was an absorbing account of the history and development of porcelain in the English language edition of *Hoechst News*. *Pirelli Review*, beautifully produced with most effective use of colour and exceptional range of subject matter, differs from the abovementioned publications in that it carries advertisements and is sold as well as having some free circulation.

Another I.C.I. publication, *Plastics Today*, while being mainly concerned with the uses to which its materials are put by other industries, currently includes an extremely interesting series of articles on research instruments. The electron microscope, the cathode ray oscilloscope and the infra-red spectrometer are among those so far described. *Plastics Today*, a quarterly, is just over one year old. Valuable, especially now when some of us are beginning to realize that Europe should be one, is the inclusion of summaries of the articles in five languages: French, German, Italian, Spanish and Portuguese. *Endeavour*, already referred to, is published in five separate langauge editions, English and the above languages with the exception of Portuguese. *Beetle Bulletin*, published by British Industrial Plastics Ltd., is another example of first-class production, excellent colour and excellent use of colour. It covers the activities of the BIP Group of Companies and the uses by manufacturers of its products, but includes a regular 'Science Supplement.' In this, in recent issues, short articles have dealt with subjects as varied as the optimum length of line from the point of view of legibility of print, and the elementary particles of matter.

But to return to the subjects of the headings. The article in *Catalyst* on plumbing, which shows that although the Elizabethans were great seafarers they were no lovers of water, records that the danger of poisoning through

lead pipes was realized and written on as long ago as A.D. 100 when Vitruvius mentioned the 'pallor of plumbers.' Later, in 1011, reference to lead again appear in the archives of the Canons of the Metropolitan Church of Florence, who inveighed against lead pipes as 'hideous poisonous devices.' Initially, lead pipes were fabricated from cast lead and the seams soldered. Many conduits in ancient Rome were thus made. In fact, only about 150 years ago were pipes first made by extrusion.

This same issue of *Catalyst* contained a fine 'profile' of Mr H. G. W. Chichester Miles, president of the Federation of British Rubber and Allied Manufacturers, and an account of his work with the Federation. A later issue includes, with some very good pictures—for boats are invariably wonderfully photogenic — an entertaining article on sailing. Incidentally, this article is in line with *Catalyst's* admirable policy of including something a little bit different. There have been really readable articles on such essential matters as golf and fishing.

Dowsing for Oil

It can be seen that these magazines cater at one time or another for almost every taste and interest. The range of subjects is encyclopaedic; from the intricacies of spectrochemistry to, for instance, the antics of water diviners.

Dowsers, or water diviners, moved into the field of oil discovery soon after the first gushers were located in the USA. As in other parts of the world they had long been known for their powers, real or imaginary, of finding underground water supplies. An article in a recent issue of the *Du Pont Magazine* describes the work of the Wigglestick Men, as they became known, in the search for oil along the Texas Gulf Coast.

Some of these men attempted to use methods that appeared to be more scientific—and thus more impressive —than the hazel or peach or willow twigs they had formerly employed. They invented elaborate metal contraptions called doodlebugs — after the doodlebug, an insect that digs a conical hole for itself in the sand by sitting in one spot and flicking out grains of sand with pronglike antennae. The operators of these contraptions were known, by derivation, as doodlebuggers. One famous doodlebugger on the Texas coast, operating on the theory that like attracts like, built himself a silver doodlebug which he claimed was capable of locating and naming

minerals under the earth. It was made with interchangeable parts so that he could go from gold to silver to oil in a matter of minutes. Oilmen paid high prices for his services.

The thought occurs, although the point is not made by the author of the article, that if such wigglestick men existed today their doodlebugs would probably be made from petroleum based plastics, although the crude oil might not recognize—and therefore not respond to—the 'likeness' of, say, polythene.

The Great Ale

On now to ale. An article in *The Vickers Magazine,* by Lord Gretton, who is a director of Bass, Ratcliff and Gretton, outlines some of the processes which go to the making of 'The great ale of England' (the title of the article), and describes a new plant, largest of its kind in the world, recently installed.

The making of malt is the primary process on which the brewing of beer ultimately depends. The object is to convert the starch content of the grain into a soluble form which can in turn be converted into malt sugars. These, fermented with the aid of yeast, produce a beverage made from barley, which is the meaning of the word beer. In the traditional type of malting, the grain is spread over a large area of floor space. The work is done by hand and the rate of germination controlled by turning the grain at regular intervals with shovels. One disadvantage of this method is that malt can only be made during the cooler months. In the new plant the grain is automatically turned and the process of germination can be carried on quite independently of weather conditions. Instead of being spread on a floor, the grain is germinated in giant drums, each 47ft. long, 12ft. in diameter and weighing 64 tons when loaded with 110qrs. of grain. The whole thing is automatically controlled but if anything happens to go wrong, alarm bells ring and lights flash. The green malt discharged from the drums is then dried in kilns, arresting germination and, after the rootlets have been removed, stored in garners until required.

Other information garnered from the article includes the fact that the annual output of the plant exceeds 38,000qrs. (7,600 tons) and that the private railway which connects the various departments of the Bass brewery operates 22 miles of track with some 20 steam and diesel locomotives in daily service.

Continued on page 321

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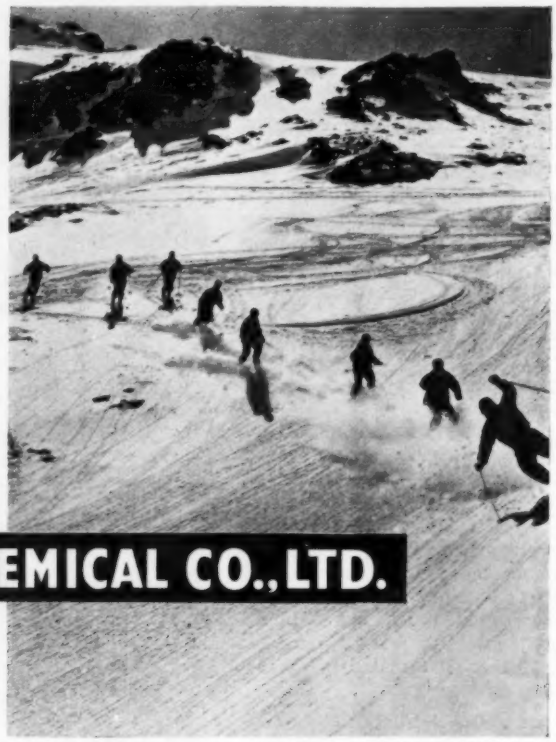

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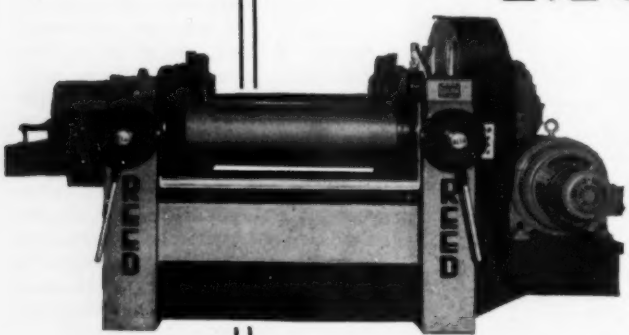

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PLUMBING—DOWSING—ALE AND PUBLIC OPINION

Continued from page 319

Public Opinion

A report of the Indian Institute of Public Opinion records the replies of thousands of Hindus to a variety of questions. One of these was, 'How would you describe the British people — Hardworking? Intelligent? Spiritual? Good-natured? Domineering?' Good-natured and intelligent got most votes but 10% of the people interviewed said they had never heard of the British people.

This fascinating information is recorded in an article, by Dr Mark Abrams, in the summer issue of *Esso Magazine*. According to Dr Abrams, at least £4m. a year is being spent by manufacturers and business firms, mostly, but also by Government departments and newspapers on research of this kind. He estimates there are at least 5,000 people in this country whose full-time or part-time occupation is to ask such questions as—What brand of toothpaste do you use? Do you smoke filter tip cigarettes? Where are you going for your holiday? and endless others.

The blame, or credit, for these mass inquisitions rests, according to the author of the article, on the shoulders of British pioneers such as Charles Booth, a Liverpool shipowner. Some 80 years ago, Booth became concerned at the mass poverty he saw all around him and determined to help erradicate it. He discovered that the only way to get the true facts was to ask the people themselves. The result was the publication during the last decade of the 19th century of many volumes of facts and figures and thus the introduction of a new techniques of social investigation. This has since extended to politics and consumer research.

The range of subjects mentioned above is merely a sample. One can read, given time and inclination, about non-iron shirts, canals, Siamese cats, Indian art, bridges, the technique of cleaning pictures, Turkish carpets and anti-freeze. Truly encyclopaedic coverage of our neighbours and the world around us.

The proposed sale of the company's estates for $(M)4,650,000 has been approved by holders of Amalgamated Bruas Rubber Estates. Under the agreement for sale already entered into, completion date is December 15 1960.

Rubber Statistics

MALAYA—JAPAN—BRAZIL

MALAYAN shipments of sheet and crepe rubber in July totalled 74,597 tons against 78,216 in June and 98,372 tons in July last year, according to statistics received from Singapore.

Of last month's shipments, the UK took 11,380 tons, USA 8,664, West Germany 7,515, Japan 8,192, the Soviet Union 1,200, China 850, Europe 19,678, Commonwealth countries 9,657 and other countries 7,461 tons.

Latex and revertex shipments last month totalled 9,257 tons against 9,906 in June and 9,762 in July last year.

Of last month's shipments, the UK took 2,927 tons, USA 1,157, West Germany 869, Japan 905, Europe 2,200, Commonwealth countries 842 and other countries 357 tons.

Japan

The Japanese Rubber Importers' Association has announced that domestic consumption of crude rubber in July amounted to 13,500 tons, unchanged from the June figure. Consumption in August was estimated to be on the same level.

The end-July stocks of crude rubber continued to show a downtrend, totalling 15,180 tons, a decline of 1,000 tons from the revised June figure of 16,180. The end-August crude rubber stocks were estimated at 15,130 tons.

The Japanese Custom House announced that 12,500 tons of crude rubber were imported in July compared with 10,790 (revised) in June.

Brazil

The Comissão Executiva de Defesa da Borracha in Rio de Janeiro has now issued figures for production and consumption in Brazil for the first quarter of this year.

Production of natural was 11,442 tons while 16,428 tons was imported. 5,335 tons of synthetic were also imported.

Consumption during the quarter was 24,634 tons, made up of 19,978 tons natural and 4,656 tons synthetic.

Stocks at the end of the period were 17,730 tons (15,261 natural, 2,469 synthetic) compared with 11,575 tons at the beginning of the year.

Companies in the News

Columbian Carbon

Columbian Carbon Company achieved the highest sales and earnings in its history for a second quarter and first half-year period, according to the interim report covering the first six months of 1960. Consolidated net sales for the six months ended June 30, increased 12.9% over the corresponding months a year ago.

Net earnings for the six months ended June 30 1960 amounted to $4 million. This was an increase of 15.5% over the initial half of 1959. Net earnings were 9.7% of sales in the first half of this year compared with 9.5% for the same period last year.

Kuala Muda

The directors of Kuala Muda Rubber Estates have decided to declare a dividend of 27% for the year 1959. Profits for that year amounted to £100,734 to which is added interest on loan to parent company relating to previous periods of £5,897. Tax absorbs £25,243 and the dividend £57,881, leaving to carry-forward £146,680 (£123,173).

The annual meeting arranged for September 1 has been cancelled and will now be held at noon on September 21 at 19 Fenchurch Street, E.C.3.

J. Mandleberg

The general turnover in the first four months of the current year of J. Mandleberg and Co. (Holdings), exceeds that of the same period of last year, says the chairman, Mr R. G. Cooke, in his annual review.

Despite considerably increased costs, group profits, before tax, more than doubled from £94,089 to £210,656 in the year ended March 31 1960.

On the rubber and plastics side of the business great strides have been made in PVC proofing in the industrial field, while in the garment section production has increased by 'leaps and bounds.'

Total group net assets at March 31 amounted to £1,075,193, compared with £974,320 previously, and included fixed assets of £639,831 (£576,079).

Dowty Group

The forward prospects of the Dowty Group are good, the chairman, Sir George Dowty, tells holders. He is confident that further progress can be looked for.

Profits before tax are £3,037,000 or £870,000 more than the previous year.

The assets have increased. After deducting all liabilities including the loan stock and future taxation, the total net assets at March 31 1960 amounted to £10,385,000.

In synthetic rubber products, following a record year, coupled with an increasing order book, building of a new factory at Ashchurch has commenced to provide a better layout and improved efficiency.

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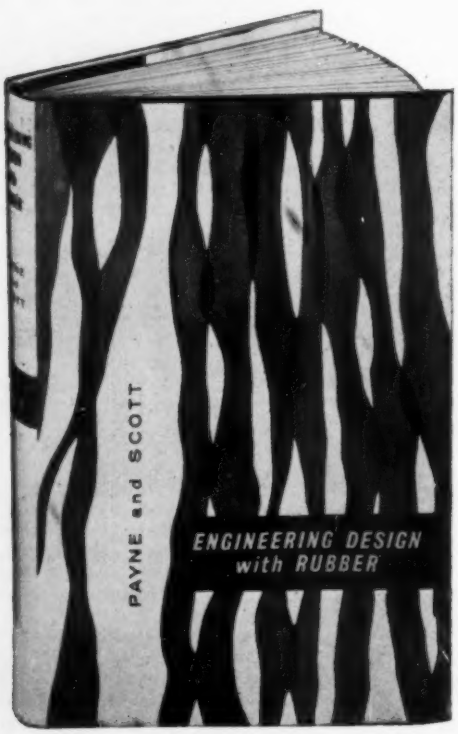

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PATENT SPECIFICATIONS

The following information is prepared from published Patent Specifications by permission of the Controller of H.M. Stationery Office. The full Specifications can be obtained from the Patent Office, 25 Southampton Buildings, W.C.2, at 3s. 6d. per copy (including postage).

Tubeless Tyre

No. 843,589. United States Rubber Co. Application and Filed, November 28 1958. Application in USA, January 30 1958. Published, August 4 1960.

A tubeless tyre is provided with a flexible, air-impervious interior wall or partition extending across the tyre, the marginal edges of the partition being attached to the side walls of the tyre approximately midway between the crown and the bead. The tyre can be inflated on each side of the partition which is preferably formed of two plies of nylon cord fabric coated with rubber. Normally, the partition lies within the well of the rim, there being no inflation pressure between the partition and the rim, and the tyre functions as a conventional tubeless tyre. In the event of deflation of the tyre by a puncture or blow-out, the tyre is reinflated by supplying air between the partition and the rim and so forcing the partition against the interior of the tread and sealing the punctured or damaged portion of the tyre.

Plastic Compositions

No. 844,141. United States Rubber Co. Application and Filed, October 29 1958. Application in USA, June 8 1958. Published, August 10 1960.

A composition of high impact strength which can be readily injection moulded comprises 10 to 40 parts of rosin, or preferably dehydrogenated rosin, and correspondingly 90 to 60 parts of a graft polymer composition prepared as described below. The graft polymer composition comprises (a) 10 to 40 parts of an emulsion polymerized synthetic rubber which is polybutadiene or a copolymer of 95% or more of butadiene and 5% or less of styrene and (b) correspondingly 90 to 60 parts of a resin emulsion comprising a copolymer of 25 to 90% of styrene and 75 to 10% of acrylonitrile. At least about 5% of the styrene-acrylonitrile resin is produced by polymerizing the monomers conjointly in admixture with a previously prepared latex of the polybutadiene or butadiene-styrene copolymer in order to graft polymerize an appreciable amount of the resin on the synthetic rubber particles.

Cross-linking Polyolefins

No. 844,231. The Dow Chemical Co. Application and Filed, February 19 1958. Application in USA, March 1 1957. Published, August 10 1960.

Polyolefins such as polythene or polypropylene are cross-linked by incorporating in the polyolefin 1 to 40%, generally 5 to 25%, of a polyfunctional monomer and then exposing the composition to high energy radiation. Examples of suitable monomers are divinyl benzene, ethylene glycol diacrylates and dimethacrylates, vinyl acrylate and methacrylate, and others. It is generally possible to fabricate the mixture of the polyolefin and the cross-linking agent into a shaped article and then expose the article to high energy radiation to effect cross-linking of the polyolefin. The cross-linking of polythene and polypropylene is described in many examples, in most of which divinyl benzene is used as the cross-linking agent.

Separating Rubber from Metal

No. 844,500. British Oxygen Research and Development Ltd. Inventor: L. D. Lamb. Application, March 19 1958. Filed, January 23 1959. Published, August 10 1960.

Rubber is separated from metal to which it is bonded by chilling the rubber-metal product by means of a liquefied atmospheric gas or a gas at a temperature below −50C. derived from a liquefied atmospheric gas. Owing to differential contraction of the metal and the rubber when the rubber-metal product is chilled, the rubber splits or tears itself away at the bond and the two components may then be readily separated.

In an example, an anti-vibration journal bearing, in which a rubber sleeve was bonded between two concentric metal cylinders, was immersed in liquid nitrogen whereby the temperature of the bearing was reduced to −196°C. After immersion for a few minutes, the bearing was removed; the rubber portion had become separated from the metal parts and possessed a number of deep cracks. The process is applicable to bondings of metal with natural or synthetic rubber and with rubber-like materials such as PVC, polythene and polytetrafluoroethylene.

Shorter Abstracts

Polymerization of Diolefins. 841,691. The Firestone Tire and Rubber Co. Filed, January 24 1957. — Polymers having properties similar to those of natural rubber are made by polymerizing diolefins, particularly isoprene, by means of a dihydrocarbon-substituted lithium amide catalyst.

Polythene Film. 842,556. E. I. du Pont de Nemours and Co. Filed, June 17 1957.—Polythene film which takes print readily and can also be easily sealed is formed from polythene containing a small proportion of an unsaturated aliphatic hydrocarbon of specified properties, examples being 11-tricosene or 17-pentatriacontene.

Polythene. 842,761. Argus Chemical Corporation. Filed, November 21 1957.—A small proportion of an organic phosphite is added to low density polythene. The phosphite is both an anti-tackiness agent and a stabilizer for the polythene.

Stabilization of Polythene. 842,872. Monsanto Chemical Co. Filed, September 3 1956. — Substances, other than amines, known to be stabilizers for PVC, are claimed as stabilizers for Ziegler-type polythene and other polyolefins.

Irradiation of Polythene. 842,873. Sequoia Process Corporation. Filed, September 5 1956. — A small proportion of a rubber accelerator or vulcanizing agent containing sulphur, selenium or tellurium, or a sulphonyl hydrazide, is added to polythene and the mixture exposed to high energy radiation.

Polymerization of Ethylene. 843,361. Henkel und Cie. GmbH. Filed, September 20 1957. — A catalyst for the polymerization of ethylene and other olefins comprises a mixture of a titanium halide and aluminium carbide.

Writing Material. 837,774. Montecatini Societa Generale per l'Industria Mineraria e Chimica. Filed, June 7 1957.—Writing material comprises a sheet of polypropylene having one or both surfaces formed with a paper-like texture.

Carbon Black. 838,009. Esso Research and Engineering Co. Filed, May 30 1958.—The properties of carbon black in rubber are improved by subjecting the black to attrition, as by ball milling. The treated black may be used with advantage in natural or synthetic rubber and is particularly suitable for use in butyl rubber.

Polyolefins. 838,502. Argus Chemical Corporation. Filed, June 23 1958. —Mercapto tin compounds are claimed as viscosity preservers for polyolefins such as polythene and polypropylene.

Tubes. 838,733. Montecatini Societa Generale per l'Industria Mineraria e Chimica. Filed, September 16 1957. —Tubes are made of polypropylene containing a high proportion of crystalline linear polymer.

Polythene Derivatives. 838,745. Spencer Chemical Co. Filed, January 29 1958.—Certain polythene derivatives containing phosphorus are claimed.

Heat-insulated Containers. 838,953. Montecatini Societa Generale per l'Industria Mineraria e Chimica. Filed, October 7 1957.—In a double-walled plastic container, the inner wall or both walls are made of a crystalline linear polymer of butene, propylene or styrene having a mechanical strength of not less than 60kg./cm.^{2} over the temperature range −10° to +100°C.

Rubber and Plastics Stock Market

A REVIEW OF PRICES AND TRENDS

ON occasions during the past few weeks stock markets have been in dazzling form. Hopes of a cut in the Bank Rate and an easing in the credit curbs—though later blunted by the disappointing trade figures — was the main factor which really got the 'little' summertime boom going. Though the sad export showing stopped it dead in its tracks the underlying strength was such that the following day the announcement arrived the smiles returned to the rialto. It was a simple case of back to the up-line for most of the top class favourites.

Further 1960 peaks were attained at different stages of the period under review. It is interesting once again to note that the most impressive progress has been made by the 'blue-chip' leaders. Like the Rock'n'Roll craze you just cannot keep these 'populars' out of the top ten. So you got, for instance, COURTAULDS climbing to a new 'high' of 91s. and DISTILLERS reaching best ever 43s. 4½d. Other star performers that are worth mentioning include DUNLOP RUBBER, TURNER AND NEWALL, BRITISH XYLONITE and DE LA RUE.

Shares of the plastics companies have, in fact, lost none of their glamour for the investor. And no wonder. Hardly a day passes without one newspaper or another pointing out the brilliant prospects for the industry generally. This is only justice after all for it has been this kind of equity that has reaped such a rich harvest for a lot of people over the past few years. Anyone with the faith we have always had would be sitting on a small fortune following our consistent advice to buy, buy and buy. But in some cases prices are now on the high side — yield returns as a result low. It can be only the long term investors who will benefit from buying at current levels. Those who are looking for short term capital appreciation might, we suggest, do better by putting their eggs in some other basket.

One of the most cheerful pieces of company boardroom news to arrive just recently has come from the giant Distillers Group. Turnover, the chairman reported, increased during the last year of trading by 11% to over £233 million. If a favourable level of national activity is maintained, planned developments for the industrial groups should in due course give rise to increased earnings, said chairman Sir Graham Hayman. They had a satisfactory year in 1959-60 with a rise of 27% in earnings. The return on capital employed compared favourably

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Share Price Movements

Par Value	Company	1960 High	Low	Aug. 13	Latest
£1	A.E. Ind. Ord.	67/-	48/10½	50/3	48/10½
5/-	Albright & W. Ord.	31/9	25/9	31/6	33/3
£1	„ „ „ 5% Pref.	17/3	15/6	15/6	16/-
5/-	Anchor Chemical Ord.	18/7½	14/9	16/3	16/9
5/-	Andersons Rub. Ord.	—	—	3/1½	3/1½
£1	Angus Geo. Ord.	47/6	34/9	46/1½	46/6
5/-	Ault & Wiborg Ord.	25/3	20/-	24/6	25/-
£1	Avon India Rubber Ord.	46/6	35/-	35/-	35/3
£1	„ „ „ 6% Pref.	20/-	17/6	18/9	18/9
10/-	Bakelite Ord.	62/6	39/9	62/6	62/3
£1	„ 6% Pref.	19/-	16/9	19/-	19/-
£1	Baker Perkins Ord.	43/3	40/-	40/-	42/9
4/-	Bank Bdg. Rubber Ord.	4/3	2/3	4/3	4/3
4/-	Brammer H. Ord.	18/6	16/9	18/6	18/6
10/-	Bridge, David Ord.	66/3	53/6	65/-	66/3
5/-	Bright, John Ord.	18/6	15/3	17/3	18/-
5/-	Brit. Blting. & Asb. Ord.	—	—	17/-	17/3
£1	„ „ „ Pref.	—	—	17/3	17/3
2/-	Brit. Ind. Plas. Ord.	12/1½	5/3	10/-	9/7½
2/-	„ 10% (tax free) Pref.	4/9	4/3	4/9	4/9
£1	British Xylonite Ord.	110/-	78/9	102/-	107/6
£1	„ „ 5% Pref.	18/9	15/-	18/7½	14/6
£1	BICC Ord.	61/3	49/9	51/-	51/6
5/-	BTR Ind. Ord.	17/3	9/9	17/1½	17/-
£1	„ „ 7½% Pref.	24/3	23/-	23/9	23/9
£1	Courtaulds Ord.	56/6	44/3xc	53/6xc	56/6
£1	„ 5% 1st Pref.	17/9	16/3	16/3	16/-
£1	„ 6% 2nd Pref.	21/-	19/-	19/3	19/-
4/-	Cow, P. B. Ord.	9/6	6/9	8/9	8/9
£1	„ „ 5% Pref.	15/6	14/-	14/-	14/-
1/-	Dannimac Mfg. Ord.	12/9	9/-	9/-	9/9
10/-	De La Rue Ord.	91/-	65/6	87/9	91/-
£1	„ „ „ 3½% Pref.	12/-	10/6	10/6	9/9
10/-	Distillers Co. Ord.	43/4½	32/9	41/3	43/4½
£1	„ „ 6% Pref.	22/-	19/6	20/-	19/6
£100	„ 5% Conv. Loan	£96	£95	£95	£95
£100	„ 5½% Unsec. Loan	£97	£87½	£87½	£87
10/-	Dunlop Rubber Ord.	29/6	21/9	26/6	29/6
£1	„ „ 5½% Pref.	19/-	16/6	16/6	16/-
£100	„ 3½% 1st Debs.	£78	£68	£68	£69
£100	„ 4½% 2nd Debs.	£87	£80	£80	£80
£1	Eng. Elect. Ord.	53/6	36/3	39/3	38/6
4/-	Ebonite Cont. Ord.	14/3	11/-	11/-	11/3
£1	English China Clays Ord.	95/-	74/6	88/6	90/6
£1	Goodyear Tyre 4% Pref.	12/9	10/9	11/-	11/6
5/-	Greeff Chem. Ord.	35/-	23/6	23/6	24/-
10/-	Greeff Chem. 5½% Pref.	9/-	8/6	8/9	8/9

Par Value	Company	1960 High	Low	Aug. 13	Latest
5/-	Hackbridge Hldg.	17/6	14/3	14/9	14/10½
4/-	Greengate & Irwell Ord.	6/6	5/3	5/9	5/3
£1	Harrisons & Crosfield Dd.	64/-	49/6	51/3	51/3
1/-	Hunt & Moscrop Ord.	2/9	1/9	2/-	2/3
£1	Imp. Chem. Ord.	65/3	56/6	64/9	64/7½
£1	„ „ 5% Pref.	18/-	16/3	16/3	16/3
£100	„ 4½% Unsec. Loan	£89½	£81	£81½	£82½
£100	„ 5½% Conv. Loan	£212½	£90xc	£90½x	£92½
1/-	Kleemann (O. & M.) Ord.	11/-	8/3	10/9	11/-
£1	„ „ 6½% Pref.	19/-	17/-	17/6	17/6
2/-	Lacrinoid Prod. Ord.	5/-	3/-	3/10½	4/9
5/-	Laporte Ind. Ord.	32/-	25/3	28/4½	31/3
£1	„ „ 7½% Pref.	24/3	23/3	23/9	23/3
£1	Leyland & Birm. Rubber Ord.	57/-	46/3	51/3	51/10½
£1	„ „ „ 6% Pref.	19/-	17/6	18/9	18/9
2/-	London Rubber	14/9	11/-	13/-	13/1½
£1	„ 6% Red. Cum. Pref.	20/-	18/9	18/9	18/9
£1	McKechnie Bros. Ord.	71/6	57/-	60/-	60/-
£1	„ „ 'A' Ord.	69/3	56/-	56/3	57/-
£1	„ „ 6% Cum. Pref.	18/-	16/-	17/-	17/-
5/-	Monsanto Chem. Ord.	28/-	23/3	26/3	28/-
£1	„ „ 3½% Pref.	12/9	12/-	12/6	12/6
£100	„ „ 6% Debs.	£103½	£98	£99	£98
5/-	Miles (H.G.) Holdgs. Ord.	11/3	9/9	10/9	10/-
£1	North British Rubber	21/3	16/6	16/6	16/9
5/-	Northwestern Rubber	—	—	11/9	11/9
5/-	Plastic Enginrs. Ord.	26/3	20/-	26/3	26/3
5/-	Redfern Holdings Ord.	5/9	4/3	5/3	5/-
2/-	RFD Ltd. Ord.	6/6	4/9	4/9	4/9
£1	„ „ 5½% Pref.	14/6	12/9	13/-	13/-
2/-	Rubber Imp. Ord.	7/9	4/6	4/6	4/6
2/-	„ „ 'A' Ord.	7/-	3/3	3/6	3/3
£1	„ „ 5% 1st Pref.	15/-	11/3	12/3	12/3
5/-	Rubber Reg. Ord.	19/3	17/-	17/-	17/-
4/-	Shaw Francis Ord.	27/6	21/3	23/-	23/-
2/-	Silentbloc Ord.	13/3	10/-	10/9	12/-
5/-	Storey Bros.	40/9	28/3	39/3	40/3
2/-	Sussex Rubber Ord.	2/3	1/3	2/-	2/-
5/-	Sutcliffe Speak Ord.	15/9	11/-	13/6	13/6
£1	Turner & Newall Ord.	115/-	100/-	104/-	112/6
£1	„ „ „ 7% Pref.	25/-	22/3	22/6	22/3
5/-	Universal Asbestos Ord.	50/-	32/6	49/9	26/3xc
5/-	Viscose Dev. Ord.	16/6	14/9	16/-	16/-
5/-	Warne W. (Holdgs.) Ord.	18/9	15/3xc	16/-	16/6

Rubber Markets

LONDON

Following further liquidation, heavy stocks and lower values at Singapore, prices resumed the declining trend. A fair recovery was not fully held and the market was still mainly bearish in the absence of any substantial weight of consumer off-take.

Latest prices are as follows:

No. 1 RSS Spot: 27⅝d.-27⅞d.

Settlement House:

September 27½d.-27⅝d.

October/December 27⅛d.-27⅜d.

January/March 27⅛d.-27⅜d.

April/June 27⅛d.-27¼d.

July/September 27d.-27⅛d.

No. 1 RSS cif basis ports:

September 27⅜d.-27⅝d.

October 27½d.-27⅝d.

Godown:

September 93¼ Straits cents nominal.

LATEX

Centrifuged 60% latex per gallon in drums, seller, September, October, 16s. 2d., cif European ports. Spot, seller, 16s. 10d. Bulk, nominal, d.w. not quoted, August. Creamed, seller, nominal, 15s. 10d. September, October. Normal, seller, September, 13s. 10d.

BANGKOK

No. 1 RSS

The price of No. 1 RSS at Bangkok on August 22 was 31.37½ (31.62½) US cents per lb.

SINGAPORE

The market was dull early on August 22. Interest was centred on nearby shipment but sellers were reluctant. Subsequently, persistent upcountry selling depressed prices but later shortcovering halted the decline. Values eased again in the afternoon but steadied once more on shortcovering. Lower sheet interest was fair at rather narrower differentials. After hours, the market was quiet.

Malayan cents per lb., fob Malayan ports to open ports

	Aug. 22	Prev. Close
No. 1 RSS, Sept.	93½– 93⅝	96⅜– 96⅞
Oct.	93¼– 94⅛	97⅛– 97¼
No. 2 RSS, Sept.	93 – 93½	96⅛– 96⅜
No. 3 RSS, Sept.	92½– 93¼	95⅛– 96⅛
No. 4 RSS, Sept.	91 – 92	94⅜– 95⅛
No. 5 RSS, Sept.	89 – 90	92 – 93
No. 1 RSS, Spot	93½– 94⅛	96⅛– 97
No. 3 blanket thick remilled crepe, Sept. ..	84 – 86	86½– 88½
No. 1 fine pale crepe, Sept. ..	103½–105½	106½–107½
2x thin brown crepe, Sept. ..	—	86½– 87½

Tone: Quiet.

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rectangular drums, fob at 176.40d. per gallon.

CEYLON

No. 1 RSS

The price of No. 1 RSS at Colombo on August 22 was 98½ (103½) Ceylon cents per lb.

NEW YORK

The New York rubber market ruled as under on August 22:

DEALERS' PRICES

US cents per lb., ex-dock

	Aug. 22	Previous
No. 1 RSS, Sept. ..	34½b–35a	35½n
Oct. ..	34½a	35n
No. 2 RSS, Sept. ..	34⅜b–34⅞a	35⅜n
Oct. ..	34⅛a	34⅞n
No. 3 RSS, Sept. ..	34⅛b–34⅜a	35⅛n
Oct. ..	34a	34⅛n
No. 1 RSS, Spot ..	36⅛n	36⅛n
No. 3 amber blanket crepe, Sept. ..	29⅛b–29⅛a	30a

FUTURES—REX CONTRACT

	August 22	Prev. Close
Sept. ..	36.30b–36.50a	36.55b–36.70a
Nov. ..	33.55b–33.65a	33.80t
Jan. ..	32.85t	33.05b–33.15a
March ..	32.45–32.50t	32.75b–32.85a
May ..	32.25b–32.50a	32.50b–32.65a
July ..	32.00b–32.25a	32.25b–32.35a
Sept. ..	31.75b–32.00a	32.00b–32.15a

Sales: 93. Tone: Steadier.

Rubber futures were easy on August 22. Prices were lower by about half a cent per lb. on scattered selling following the weakness in Singapore. Later in the day, futures steadied on some covering. Dealings for the day were fair. Traders noted light factory and dealer buying of physicals. In the closing stage, futures were steadier.

AMSTERDAM

The Amsterdam rubber market ruled as under on August 22:

Guilders per kilo

No. 1 RMA	Aug. 22	Previous
August	2.73	2.78
September ..	2.73	2.78
October	2.72	2.75½
November ..	2.71	2.75½
December ..	2.70	2.75½
Oct./Dec. ..	2.70	2.75½

Sales: 30. Tendency: Dull.

DJAKARTA

The market opened very quiet owing to disappointing overseas market development. Steadier conditions prevailed in the afternoon. Ten tons of Sheet No. 1 for ready delivery were sold at between 30.50 and 31 rupiahs per kilo. The market closed steadier after easy.

Rupiahs per kilo

	Aug. 22	Previous
Spot No. 1 priok ..	30.00b	30.00b
Spot No. 2 priok ..	29.00b	29.00b
Spot No. 3 priok ..	27.25b	27.25b
No. 1 fine pale crepe, spot	31.00b	31.00b

Tone: Steadier.

STOCK MARKET

Continued from page 324

with leading competitors. Scotch whisky and gin contributed some 80% and the industrial group 20% of profits.

Credit for the £6 million rise in income to £32.8 million was apportioned broadly between potable and chemical interests in the proportion in which they have contributed to profits in the past. Time, it was pointed out, is required to make arrangements for a capital issue and members were informed that at this stage it is difficult to say whether they will have been completed before the declaration of next year's interim which is to be raised 1% to 6% on the present capital. The chairman warned that it should not be taken that the current year's TOTAL will be higher.

Nigerian Rubber Prospects

The chairman of the Seafield Amalgamated Rubber Co. Ltd. is reported to have said that rubber plantations in Nigeria should be as good and high yielding as those in Malaya.

Seafield has a 6% interest in the Ilushin Estates Ltd., involving a commitment to subscribe £50,000 over some seven years and the company is prepared to invest further.

The project started in 1957 in conjunction with the Colonial Development Corporation and the Western Region Production Development Board. So far 1,364 acres have been planted and a further 100 acres have been felled ready for planting this year

Export Management

A one-week residential course on 'Export Management,' mainly designed for managing directors, export directors, and export sales managers and senior executives, is to be held at Sundridge Park Management Training Centre, Bromley, Kent, from November 27 to December 2.

It will review factors affecting export policy and marketing procedures under present world conditions.

Dr Richard G. Bauman has been named manager of tyre research in the products research and development department of The B. F. Goodrich Company Research Centre, Ohio. Dr R. Emerson Lynn has been named manager of programme planning for B. F. Goodrich Chemical Company, Cleveland.

Industry INTELLIGENCE

Technical Data

Polysar Krylene 602

Polysar Krylene 602, the most recently developed Polysar general purpose rubber, is a non-staining, cold, butadiene-styrene copolymer with good processing qualities. Technical Report No. 9:6C issued by Polymer (UK) Ltd., Walbrook House, Walbrook, E.C.4, deals with the use of the material for the manufacture of moulded-on soling.

Details are given of a compound for soft soles, which has good modulus and tensile strength and good adhesion to a chrome leather tanned upper. The mould flow properties are good and the uncured stock can be stored for at least a month without loss of processing quality. The report gives the experimental procedure, recipe and properties of the compound.

Tinopal Brightener

The Geigy Company Ltd., Rhodes, Middleton, Manchester, have recently introduced a new optical brightening agent. This is a development of Tinopal PCRP, is designated Tinopal PGP, and is similar to the first mentioned except that it is characterized by a greenish blue fluorescence instead of reddish blue. This is of particular advantage when, for example, anatase Titanium dioxide is used to produce a pure white colour. The light fastness is better than PCPR in opaque PVC, polythene and polystyrene, but is only moderate in polyester and acrylate resins. Small amounts of Irgalite pigments used with Tinapol are effective in transparent PVC, cellulose acetate and polystyrene, and are particularly effective in opaque films with green and yellow pigments. For red and blue, however, PCRP is recommended.

High Temperature Vinyl

A vinyl material described in Service Bulletin G-21, issued by B. F. Goodrich Chemical Co., Cleveland, Ohio, is known as Hi-temp Geon. It is a polyvinyl dichloride and is capable of withstanding temperatures considerably higher than other vinyl materials. It has good retention of properties at high temperatures, tensile strength at 212°F., for instance, is 2,000 psi, high modulus over a wide range of temperatures, high impact strength and toughness and excellent chemical resistance. Regular equipment can be used for processing the material and it can be sawn and formed to desired curvatures by heating. Expected outlets for Hi-temp are for both hot and cold water installations in houses and industrial plant and for chemical plant applications where resistance to hot corrosive liquids at temperatures up to 200°F. is required.

The material will be available in limited quantities until commercial facilities are completed in 1961.

Storage of Vulcacel BN

Further notes on the storage and handling of Vulcacel BN are given in Technical Information sheet Rubber PC/R.71 issued by Imperial Chemical Industries Ltd. Vulcacel BN, used as a blowing agent for rubber, must be treated as a highly combustible material and should be stored away from stocks of other combustible materials and away from workshops. Precautions must also be taken during handling but the incorporation of Vulcacel BN into rubber compounds can be carried out quite safely because of the small quantity being handled.

Machines, Materials and Equipment

Monorail Conveyor

T. and T. Works Ltd., Billesdon, Leicester, have been appointed sole concessionaires for the manufacture and distribution in the UK and commonwealth of the American Chainveyor overhead monorail conveyor system. A working sample installation will shortly be on show at their works, from which visitors will be able to judge for themselves the qualities of the system.

Features of the system include light weight with strength, adaptability, lower cost, total enclosure of all working parts and ease of installation.

Coseley Buildings

The first of a new series of leaflets to be issued by Coseley Buildings Ltd., Wolverhampton, emphasizes the success which these pre-engineered buildings have had in overseas areas. Their works were recently visited by the Minister of Works, as part of the government campaign for increased exports. Coseley buildings are designed in clear spans up to 100ft. and can be of virtually unlimited length, with eaves heights up to 25ft. They can be covered in galvanized mild steel, asbestos cement or aluminium, with roof lights in a wide variety of translucent or transparent materials.

Magnetic Vibrator Feeder

A new design of magnetic vibrator feeder has been marketed by Magco Ltd., Porchester, Hants. The magnet of this vibrator is attached to the tray instead of the base of the unit, both tray and base are made of aluminium castings resulting in considerable weight saving and cost.

A controller is supplied which, whilst the feeder is in operation, enables an infinitely variable feeding rate from zero to maximum to be achieved.

These feeders are produced in a range of sizes.

Publications

Philblack AOIE

A brochure recently published by Phillips Chemical Company deals with Philblacks in natural and synthetic rubbers. It describes the manufacturing process, the physico-chemical and reinforcing properties, the moisture absorption characteristics, the performance qualities and other pertinent data on the four different grades of oil furnace carbon blacks produced by the company.

The first of these was Philblack A (FEF) type introduced in 1943, this was followed in 1947 by Philblack O (HAF) black, and Philblack I (ISAF) and E (SAF) were produced subsequently as the need arose for more highly reinforcing blacks.

Hexahydrophthalic Anhydride

A 17-page booklet describing the characteristics and suggested uses for hexahydrophthalic anhydride is now available from Allied Chemical International of New York.

The new brochure, I-2R, lists chemical and physical properties and the strength of the compound and its physiological hazards and handling procedures.

The compound is used in the manufacture of alkyd resins, coatings, adhesives and resins, insecticides and as a synthetic lubricant for diffusion pumps.

Reinforced Plastics

A booklet on reinforced plastics was published two years ago by Fibreglass Ltd., but it was found that owing to the constant progress taking place in this field, particularly with regard to the development of improved moulding techniques, the introduction of new products both in the resin and reinforcement sides and the advent of new suppliers, that the problem of keeping the booklet up to date was very difficult. In order, therefore, to allow more flexibility and topicality, this guide to reinforced plastics has now been republished in three parts as follows: Section 1. Introduction and Materials. Section 2. Moulding Techniques, Design and Fabrication. Section 3. Properties and Suppliers.

Material Prices

Prices of materials appear regularly in RUBBER JOURNAL AND INTERNATIONAL PLASTICS on the last Saturday of each month. It will be appreciated if suppliers will give notification of any price changes and additions to or deletions from their range. Comments on the present materials and classifications are invited in order that the list may be made of maximum service to our readers.

Unless otherwise stated prices are per lb. In most cases prices vary according to quantity. pc—per cwt pg—per gallon pt—per ton ag—according to grade xs—ex-store xw—ex-wharf dp—duty paid sp—special prices for contracts del—delivered cp—carriage paid

Accelerators

Alpha	5s. 8d.—6s. 4d.
Ancap	3s. 8d.
Ancap Zinc salt cp	2s. 10½d.
Ancatax cp	4s.
Ancazate ME cp	6s. 10d.
Ancazate Q del	6s. 4d.
Ancazate ZZ del	5s. 3d.
Ancazide ME cp	6s. 2d.
Cu.D.D	9s. 3d.—10s.
D.Bu.D	10s. 6d.—11s. 3d.
D.D.D	12s. 2d.—13s. 3d.
D.P.G. cp	3s. 8d.
D.O.T.G. cp	3s. 8d.
Dibenzo GMF	27s.—28s. 6d.
Furbac cp	5s. 3d.
Gamma	10s. 6d.—11s. 3d.
GMF	27s.—28s. 6d.
L.M.D	9s. 3d.—10s.
M.Z.1	3s. 6d.—4s. 2d.
N.Bu.D	10s. 6d.—11s. 3d.
Ni.P.D	12s. 2d.—13s. 3d.
P.P.D	12s. 2d.—13s. 3d.
P.T.D	12s. 2d.—13s. 3d.
Robac 22	10s.—11s. 3d.
Robac 44	9s. 1d.—9s. 10d.
S.P.D	9s. 3d.—10s.
Suparac M	9s. 7d.
T.B.U.T	15s.—16s.
T.E.T	6s. 6d.—7s. 4d.
Thiuram P.25	15s.—16s.
T.M.S	7s. 8d.—8s. 6d.
T.M.T	5s. 4d.—6s. 3d.
Vulcacit CZ deldp	7s. 1d.
Vulcacit F deldp	4s. 8½d.
Vulcacit NP deldp	11s. 2d.
Vulcacit P Extra N deldp	8s. 1d.
Z.B.E.D	15s.—16s.
Z.Bu.D	6s. 3d.—7s. 3d.
Z.D.C	5s. 1d.—5s. 7d.
Z.L	9s. 3d.—10s.
Z.P.D	9s. 3d.—10s.

Antioxidants and Antiozonants

Agerite HPX cp	4s. 8d.
Antioxidant 2246 del	12s. 4d.
Antioxidant SP del	4s. 6d.
BLE-25	3s. 7d.—4s. 5d.
BXA	3s. 6½d.—4s. 5½d.
Naugawhite	4s. 9d.—5s. 6d.
Octamine	3s. 9d.—4s. 6d.
Polygard	3s. 7½d.—4s. 5d.
UOP 88 xs	9s. 3d.
UOP 288 xs	9s. 3d.
Wing-Stay S	3s. 8d.—4s.
Wing-Stay T	4s. 10d.—5s. 6d.
Wing-Stay 100	10s. 6d.—11s. 6d.

Compounding Ingredients

Barytes ptag	£10—£40
Calcium Silicate del	9d.—10½d.
Calcene ptxw	£52—£69 10s.
Carbonate, Light Mg. ptsp	£97
Carbonate, Actidated Ca. pt	£28—£30
Carbon Blacks:	
Conductex SCF	1s. 2½d.
Continental AMPC ag	11½d.—1s. 4½d.
Continex FEF ag	9½d.—10½d.
Continex HAF ag	10½d.—11d.
Continex HMF ag	9½d.—9½d.
Continex ISAF ag	1s. 0½d.—1s. 0½d.
Continex SRF and SRF-NS ag	8½d.—9d.
Dixie 45 GPF xs	6½d.—7½d.
Dixie 60 HAF	8d.—9d.
Furnex SRF	9d.
Kosmos 45 GPF	6½d.—7d.
Kosmos 60 HAF	7½d.—8d.
Magecol 888 SRF	7.33d.
Micronex MPC	11½d.
Micronex W6 EPC	11½d.
Philblack A. FEF xs	7d.—8d.
Philblack E. SAF xs	1s. 0½d.—1s. 1d.
Philblack G. GPF xs	6½d.—7½d.
Philblack I. ISAF xs	9½d.—10½d.
Philblack O HAF xs	7½d.—5½d.
Regal 300	7½d.—8d.
Regal 600	9½d.—10d.
Statex B. FF	10½d.
Statex R. HAF	11d.
Statex 93 HMF	9½d.
Sterling SO FEF	7d.—7½d.
Sterling V. GPF	6½d.—7d.
Ukarb 327 GPF xs	6½d.—7½d.
Ukarb 340 xs	7½d.—8½d.
Vulcan 6 ISAF	9½d.—10d.
Vulcan C CF	11d.—11½d.
Vulcan 3 HAF	7½d.—8d.
Vulcan XXX SCF	1s. 2½d.—1s. 2½d.
China Clay ptagxs	£12—£68 10s.
Factice Dark	1s. 0½d.
Factice Light	1s. 7d.
Kieselguhr Spanish White ptxs	£37 12s. 6d.
Lithopone 30% ptxs	£68 10s.
Manosil VN3 pt	£120 5s.—£150 5s.
Micafine Powdered Mica ptxs	£67 10s.
Ochre Yellow pcxs	£1 19s.
Oxide Light Mg ptsp	£245
Oxide Red pcxs	£4 3s.
Oxide Titanium 98% pcxs	£8 8s.
Rutiox CR pcxs	£9 3s.
Rubber Gen. Gran. Mineral ptxs	£35 5s.
Shellac Dewaxed xs	1s. 9d.—2s. 3d.
Shellac Orange xs	2s.—3s. 9d.
Silica Hydrated ptxs	£113
Sulphur Manox Insoluble del	1s. 9d.
Sulphur Powdered ptdel	£20 17s.
Sulphur Sublimed Flowers ptxs	£52 10s.
Talc Italian ptxs	£28 2s. 6d.
Tufknit Durham CS	8½d.—10½d.
White Lead Dry ptdelsp	£116 5s.
Whitetex 2 Clay ptxs	£40 10s.
Whiting ptxs	£5 9s. 6d.—£7 7s. 6d.
Zinc Oxide pcdel	£6

Plasticizers and Softeners

Abalyn pc	220s.—271s.
Al Stearate ptxwdp	£253 10s.
Bisoflex 102 pt	£513—£568
Butyl Ricinoleate	2s. 6d.—2s. 6½d.
But. Ac Ricinoleate	3s. 0½d.—3s. 1½d.
Butyl Stearate pt	£277—£282
Ca. Stearate ptcp	£220
Diallyl Phthalate	3s. 11d.—4s. 11½d.
Dialkyl Phthalate pt	£221—£222
Dibutyl Phthalate pt	£203—£204
Dibutyl Sebacate	5s. 9½d.
DiOA pt	£354—£357
DiOS sp	5s. 0½d.—5s. 2d.
DOA pt	£414—£420
DOP pt	£276—£277
DOS sp	5s. 7½d.—5s. 9d.
Disobutyl Phthalate pt	£196—£197
Diisooctyl Phthalate pt	£221—£222
Dinonyl Phthalate pt	£211—£212
DNS sp	5s. 2½d.—5s. 4½d.
Ester Gum pcag	130s.—150s.
Flexol 3GO	4s. 8d.
Hercolyn pc	242s.—294s.
Lankroflex ED3	3s. 2d.—3s. 2½d.
Lankroflex 29 pt	£216—£217
Lead Stearate ptxwdp	£223 10s.
Methyl Ricinoleate	2s. 4d.—2s. 4½d.
Me. Ac Ricinoleate	2s. 11½d.—3s. 0½d.
Polyglycol Oleate 400 pt	£285
Reomol D79A pt	£354—£357
Reomol D79S sp	5s. 0½d.—5s. 2d.
Reoplex 100 sp	6s. 1½d.—6s. 2½d.
Reoplex 110 sp	5s. 10d.—6s. 5½d.
Reoplex 220 sp	5s. 6½d.—5s. 8d.
Reoplex 300 sp	7s. 2d.—7s. 3½d.
Reoplex 400 sp	4s. 2½d.—4s. 4d.
Rosin Oil pgag	8s.—18s.
Triphenyl Phosphate pt	£366
Tricresyl Phosphate pt	£233
Trixylyl Phosphate pt	£200
Zinc Stearate ptdel	£220—£230

Solvents and General Chemicals

Acetic acid ptdel	£97—£106
Acetic Anhydride ptdel	£128
Acetone ptdel	£75—£120
Alcohol:	
Absolute 74.5 op pgdel	4s. 0½d.—4s. 4½d.
Butyl pt	£132—£193 10s.
sec-Butyl ptdel	£128—£168
Ter-Butyl ptdel	£172—£195
Isopropyl Tech. 99% pgdel	5s.—6s. 5½d.
Butyl 'Carbitol' pt	£283
Butyl Acetate pt	£159—£217
Caprylic Acid ptdel	£395
Carbon Bisulphide ptxs	£71 10s.
Carbon Tetrachloride pg	12s. 4d.—20s.
'Cellosolve' Acetate pt	£250
Cresol m- 98% del	4s. 9d.
Cresol o- 30/31°C. del	1s.
Cresol p- 34/35°C. del	5s.
Ethyl Acetate pt	£131—£189
Formaldehyde ptdel	£40
Glycol:	
Diethylene pt	£158
Ethylene pt	£132
Polyethylene 200 pt	£214
" 300 pt	£214
" 400 pt	£214
" 1,500 pt	£264
" 4,000 pt	£274
" 6,000 pt	£294
Isopropyl Acetate pt	£126—£184
Isobutyl Acetate 80% pt	£126—£185
Lauric Acid ptdel	£273
M.E.K. ptdel	£134 10s.—£143 10s.
M.I.B.K. ptdel	£166—£209
Methylated Spirits pgdel:	
Industrial 61op	5s. 5½d.—7s. 2d.
" 74 op	6s. 3d.—7s. 11½d.
'Q' grade 68 op	8s. 5½d.—10s. 5d.
Pyridinised 66 op	5s. 10d.—7s. 6½d.
Denatured Methanol	3s. 9½d.—4s. 10d.
Monoethanolamine pt	£252
Naphtha Coal tar pg:	
Heavy 90—190	4s.
Light 90—160	5s. 1d.
Palmitic Acid ptdel	£147
Phenol pldel	1s. 4d.—1s. 7d.
Pyridine pg	16s. 6d.
Stearine ptag	£108—£130
Toluol Pure/Nitration pg	5s. 8d.
Toluol 90's pg	5s.
Triethanolamine pt	£224
Xylol 2/30 pg	5s. 9d.

Brooklands County Technical College, Weybridge, is running courses on reinforced plastics and mould design during the 1960/61 session, as well as the City and Guilds Intermediate Technology of Plastics.

Kuala Reman Rubber Estates announces that a contract has now been signed for the sale of its Nada division for $M1.45m. (£169,167).

TRADE MARKS

Objections to the registration of any of the undermentioned applications may be lodged with the Comptroller-General of Patents, Designs and Trade Marks at the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, within one month of the date mentioned. The objections must be stated on Trade Marks Form No. 7, cost £2, obtainable through any money order office. The extracts—from 'The Trade Marks Journal'—given below are reproduced by permission of the Controller of H.M. Stationery Office.

BIPLAS (800,481) Plastics included in Class 1 and synthetic resins for use in manufacture; and chemical substances for use in the plastics industry, adhesives for use in industry, and chemical substances for the treatment of textiles, paper and of leather in the processes of manufacture. B.I.P. Chemicals Ltd., Popes Lane, Oldbury, Birmingham. (Class 1; June 21 1960).

BIPLAS (800,482) Paints, coating compositions (in the nature of paint), varnishes (other than insulating varnish), lacquers and enamels (in the nature of paint). B.I.P. Chemicals Ltd., Popes Lane, Oldbury, Birmingham. (Class 1; June 21 1960).

BUCRON (792,592) Tyres, inner tubes therefor; and parts and fittings included in Class 12 for land vehicles, all made of natural rubber, synthetic rubber or of plastics. Esso Standard Oil Co., 100 West Tenth Street, Wilmington, Delaware. Address for service is c/o D. Young and Co., 9 Staple Inn, London, W.C.1. (Class 12; June 21 1960).

POLYCELL (747,009) Laminations of synthetic resin plastics and regenerated cellulose in the form of sheets, rods, tubes and shaped sections, and included in Class 17. British Cellophane Ltd., Bath Road, Bridgwater, Somerset. (Class 17; June 21 1960).

BUCRON (792,591) Gutta percha, indiarubber, balata, artificial gutta percha, artificial indiarubber, artificial balata; plastics included in Class 17 in the form of sheets, blocks, rods and tubes, all for use in manufacture; and articles included in Class 17 made from the aforesaid materials. Esso Standard Oil Co., 100 West Tenth Street, Wilmington, Delaware. Address for service is c/o D. Young and Co., 9 Staple Inn, London, W.C.1. (Class 17; June 21 1960).

TOOTAL (796,149) Articles included in Class 18 made wholly or principally of plastics. Thermo Plastics Ltd., Luton Road Works, Dunstable, Bedfordshire. (Class 18; June 21 1960).

TWILCLAD (793,825) Wire coated with plastics (not for electrical purposes). Tinsley Wire Industries Ltd., Sheffield Road, Sheffield, 9. (Class 6; June 28 1960)

BLACK DIAMOND (796,690) Transmission and conveyor belting included in Class 7. J. H. Fenner and Co. Ltd., Marfleet, Hull. (Class 7; June 28 1960).

BARPAK (B800,843) Packing materials made of rubber, rubberised hair (the rubber predominating), and of artificial rubber; and containers made of plastics included in Class 17 for packing purposes. Barrett Packaging Ltd., Alma Park, Grantham. (Class 17; June 28 1960).

COLOPLAST (801,945) Bags made of plastics, being surgical appliances for use in the treatment of colostomy and ileostomy, and for use by persons suffering from colostomy and ileostomy. Dansk Coloplast Aktieselskab, Gladsaxevej 311A, Soborg, Copenhagen, Denmark. Address for service is c/o F. J. Cleveland and Co., 29 Southampton Buildings, Chancery Lane, London, W.C.2. (Class 10; June 28 1960).

POLYMATIC (796,168) Apparatus for heating pipes, pipe fittings and sheets (all being of thermo-plastics) prior to welding. Chemical Pipe and Vessel Co. Ltd., 1 Hayes Lane, Kenley, Surrey. (Class 11; June 28 1960).

PERSPEX

(795,033) Electric lighting apparatus and appliances (none being for photographic purposes) and installations for ventilating, water supply and sanitary purposes; lighting fittings; and baths. Imperial Chemical Industries Ltd., Imperial Chemical House, Millbank, London, S.W.1. (Class 11; June 28 1960). Also Class 19; building materials, sinks and drain traps (795,036).

SURE-LOX (B784,679) Book-binding materials made of plastics. General Binding Corp., 1101 Skokie Highway, Northbrook, Illinois, U.S.A. Address for service is c/o Pollak, Mercer and Tench, Audrey House, Ely Place, London, E.C.1. (Class 16; June 28 1960).

POLARITE (791,016) Sheets and shaped sections, all included in Class 17 and all made of expanded polystyrene plastics. Commerce Factors (G.B.) Ltd., Gallows Park, Torpoint, Cornwall. (Class 17; June 28 1960).

POLARPOR (791,017) Sheets and shaped sections, all included in Class 17 and all made of expanded polystyrene plastics. Commerce Factors (G.B.) Ltd., Gallows Park, Torpoint, Cornwall. (Class 17; June 28 1960).

Ω

(796,991) All goods included in Class 21 made wholly or principally of plastics. Patent Consolidation Ltd., 5 St. James's Place, London, S.W.1. (Class 21; June 28 1960).

NIPLAS (803,340) Electric cables. Greengate and Irwell Rubber Co. Ltd., Greengate Works, Greengate, Salford. (Class 9; July 26 1960).

AVTREV (799,109) Boards made of plastics and included in Class 17; and insulating materials. Bartrev Board Co. Ltd., Henrietta House, 9 Henrietta Place, London, W.1. (Class 17; July 26 1960).

CONTIROL (801,399) Corrugated sheets made from plastics and for use in building. C.L.D. Ltd., 7/8 Great Winchester Street, London, E.C.2. (Class 19; July 26 1960).

MANICARE (804,274) Gloves composed of natural or synthetic rubber for household or industrial purposes. Dunlop Rubber Co. Ltd., Fort Dunlop, Erdington, Birmingham, 24. (Class 21; July 26 1960).

Gielle

(800,771) Tubes included in Class 17 made of extruded plastics; pressed and welded pipe joints of plastics and parts included in Class 17 of these goods. Società Del Gres Ing. Sala and C., via Bazzini 7, Milan, Italy. Address for service is c/o Allam and Tregear, 2-3 Norfolk Street, Strand, London, W.C.2. (Class 17; July 26 1960).

NEW COMPANIES

Abbey Mouldings Ltd. (665,970).—July 26. Capital: £100 in £1 shares. To carry on the business of manufacturers of and dealers in goods made wholly or partially from plastic, etc. The directors are: Gordon A. Taylor, Thornfield, Partington, Ches.; Harry R. Taylor, Flaxbourne, The Firs, Bowdon; William M. Riste and Joseph T. Moorhouse. Regd. office: 7 Green Fold, Abbey Hey, Manchester, 18.

Screenoprints (Vacuum Formers) Ltd. (665,717).—July 21. Capital: £1,000 in £1 shares. To carry on the business of manufacturers of and dealers in plastic, modelling and moulding materials. The directors are: Kenneth A. Harris, 56 Highams Road, Hockley, Essex; Daniel J. Limeham, 14 Richmond Street, Southend-on-Sea. Regd. office: Main Road, Hawkwell, Essex.

Kerry's Tyre Services Ltd. (665,894).—July 25. Capital: £101,000 in £1 shares (1,000 ordinary and 100,000 5% non-cumulative redeemable preference). To carry on the business of dealers in and distributors of all kinds of vehicle tyres, tyre covers and inner tubes, etc. Solicitors: Ernest G. Scott and Co., 31/2 Broad Street Avenue, E.C.2.

Latnatin Plastics Ltd. (666,814).—August 4. Capital: £100 in £1 shares. To carry on the business of manufacturers of and dealers in plastic, etc. Secretary: T. A. Herbert, 156 Strand, W.C.2.

PATENT LIST

Printed copies of the Specifications in the following list, published by permission of the Controller of H.M. Stationery Office, can be obtained from the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d., including postage.

COMPLETE SPECIFICATIONS ACCEPTED

Open to public inspection on August 4, 1960

Agricola Reg. Trust. Method of working thermoplastic expanded plastic and articles made by the method. 843,483.

Dunlop Rubber Co. Ltd. Composite products containing textile yarns and plastic compositions. 843,464.

Angus and Co. Ltd., G., Balkin M., and Turner, D. G. Production of reinforced endless rubber belts or bands. 843,461.

British Nylon Spinners Ltd. Devices for testing filamentary structures. 843,623.

Dunlop Rubber Co. Ltd. Apparatus for moulding or reconditioning pneumatic tyres. 843,433.

Projectile and Engineering Co. Ltd. Injection moulding-machines. 843,534.

Kodak, Ltd. Film or sheet-forming apparatus. 843,629.

Kodak, Ltd. Polymers and photographic emulsions containing them. 843,501.

Kodak, Ltd. Light-sensitive polymers for photomechanical printing processes. 843,541.

Minnesota Mining and Manufacturing Co. Low-adhesion backsized tape or film. 843,539.

Standard Telephones and Cables Ltd. Manufacture of tubes and laminates. 843,437.

Chatelet, N., and Goller, H. Injection moulding and machines therefor. 843,443.

Bergstedt, M. A., and Herr, B. F. Adhesive sheets or tapes and a method of producing them. 842,983.

Thüringisches Kunstfaserwerk W. Pieck Schwarza, Veb. Method of melt spinning of synthetic organic linear high polymers. 843,179.

Thüringisches Kunstfaserwerk W. Pieck Schwarza, Veb. Method of melt spinning of synthetic organic linear high polymers. 843,179.

W. Schemuth. Processes for the manufacture of terephthalic acid. 843,180.

American Viscose Corporation. Union-dyeing of acrylic fibre blends. 843,116.

Farbenfabriken Bayer A.G. Process for sizing textile filaments. 843,185.

Fisher and Ludlow Ltd. Belt conveyers. 843,117.

Montecatini Soc. Generale per L'Industria Mineraria e Chimica. Products containing grafted polymers and process for their preparation. 843,190.

A funnel with exceptional resistance to chemicals, oils and greases is now being produced by Mendle Bros. from Rigidex high-density polythene. Funnel diameter is 6¼in.

Farbenfabriken Bayer A.G. Apparatus for producing porous or homogeneous plastics. 843,197.

Union Carbide Corporation. Preparation of cyclic dimethylsiloxanes. 843,273.

Imperial Chemical Industries Ltd. Polymerization process. 843,611.

R. Pluhacek and J. Trachta. Material comprising bonded fibres and method of producing same. 843,612.

G. L. Cabot Inc. Polyethylene compositions and process for their manufacture. 843,617.

Soc. d'Etudes Chimiques pour L'Industrie et L'Agriculture. Desizing of cellulose fabrics. 843,559.

Rohm and Haas Co. Thermosetting compositions shaped articles and method of making same. 843,139.

Sandoz Ltd. Dyeing of man-made fibres in the mass. 843,645.

Vereinigte Glanzstoff-Fabriken A.G. Process for making threads from viscose. 843,204.

E. I. Du Pont de Nemours and Co. Normally solid copolymers of aryl diolefins and terminally unsaturated olefins and process for preparing them. 843,207.

Imperial Chemical Industries Ltd. Manufacture of polyethylene terephthalate. 843,356.

Henkel and Cie G.m.b.H. Process for the production of solid thermoplastic synthetic materials. 843,361.

Dow Chemical Co. Conjunct chlorination procedure for polyolefines. 843,209.

Phillips Petroleum Co. Method for recovery of polymers. 843,027.

Dow Chemical Co. Compositions comprising polyvinylchloride blended with linear chlorinated polyethylene. 843,210.

Esso Research and Engineering Co. Polymerization of olefins and catalysts therefor. 843,408.

E. A.B.E. Method of making an inlay casting mould or a precision casting mould from a wax pattern. 843,412.

London Rubber Co. Ltd. Formation of beads on the edges of rubber articles produced by dipping. 843,413.

Minister of Aviation, formerly Minister of Supply. Tubular articles of fibre reinforced materials. 843,153.

Owens-Corning Fiberglass Corporation. Process for producing articles of synthetic resin bonded fibrous glass and articles produced thereby. 843,154.

Imperial Chemical Industries Ltd. Tubular film manufacture. 843,113.

Pirelli S.p.A. Moulding apparatus, the manufacture of such apparatus and moulding processes. 843,300.

Sandoz Ltd. Mass coloration of artificial fibres. 843,306.

Westinghouse Electric Corporation. Glycidyl polyethers and products produced therefrom. 843,233.

Distillers Co. Ltd. Production of hydro-brominated derivatives of olefinically unsaturated compounds. 843,234.

Badische Anilin- & Soda Fabrik A.G. Production of polyesters of carbonic acid. 843,314.

E. I. Du Pont De Nemours & Co. Photopolymerizable compositions. 843,238.

De Bataafsche Petroleum Maat Schappij. Compositions containing polymeric substances. 843,239.

Algemene Kunstzijde Unie N.V. Method for the manufacture of spun dyed threads and staple fibres from cellulose solutions. 843,243.

Union Carbide Corporation. Production of glycidyl polyethers of polyhydric phenols. 843,575.

E.M.B. Co. Ltd. Die casting and injection moulding machines. 843,056.

Dow Chemical Co. Water-in-oil suspension polymerization of water-soluble ethylenically unsaturated monomers. 843,374.

Farbenfabriken Bayer A.G. Process for the production of shaped elements from acrylonitrile polymers. 843,246.

O. Pfrengle. Adhesives in powder form. 843,375.

Badische Anilin- & Soda Fabrik A.G. Bonding of polyamides to rubber. 843,377.

V. E. Topham. Designs made of glass and/or plastic for attaching to windows, glass panels and the like. 843,378.

Dow Chemical Co. Method for radiation graft copolymerization of N-vinyl lactam monomers on acrylonitrile polymer substrates. 843,063.

General Tire & Rubber Co. Method of producing a polyurethane article. 843,380.

Lonza Electric & Chemical Works Ltd. Process and apparatus for extrusion of thermoplastic material. 843,320.

Goodyear Tire & Rubber Co. Tyre sidewall finishing machine and method. 843,530.

De Bataafsche Petroleum Maatschappij N.V. Polymerization of aliphatic olefins and the resulting polyolefins. 843,424.

Chemische Werke Hüls A.G. Production of unsaturated polyesters containing tetrahydrophthalic acid and suitable for air-drying unsaturated polyester resins. 842,958.

Midland Silicones Ltd. Organopolysiloxane resin coating compositions. 843,074.

Switzer Bros. Inc. Synthetic rubber compositions. 843,588.

Union Carbide Corporation. Polymerization of olefines. 843,160.

United States Rubber Co. Reserve chamber tubeless tyre. 843,589.

Knapsack-Griesheim A.G. Process for the production of monovinyl acetylene of high purity. 842,969.

Esso Research & Engineering Co. Polymerization catalysts. 843,385.

Esso Research & Engineering Co. Removal of acetylenes from butadiene-bearing streams with cuprous ammonium acetate. 843,255.

Solvic S.A. Polymerization process. 843,170.

COUNTY COURT JUDGMENTS

NOTE.—*These Judgments which are supplied from the Registry of County Court Judgments, Lord Chancellor's Department, 3 Dean's Yard, London, S.W.1, are not necessarily for debt, and some may have since been satisfied. They may be for damages or otherwise, they may relate to actions bona fide contested between the parties, or they may be against defendants liable in a representative capacity and not personally; but no distinction is made on the register. A judgment does not imply inability to pay. Judgments are not returned to the Registry if satisfied in Court Books within twenty-one days.*

T. A. WILLIAMS, 36 The Park, Kingswood, Bristol, tyre dealer. Bristol, £33, June 16 1960.

REINFORCED FIBREGLASS LTD., 235 Berwick Avenue, Trading Estate, Slough, Bucks., manufacturers of fibreglass, plastics, etc. Bloomsbury, £42, June 17 1960.

Latest Wills

Dr Philip Schidrowitz, of 82 Haven Green Court, Ealing, W., who died on May 17 last, left £5,336 gross, £5,177 net value.

Mr Woolf Glassberg, of 79 Trafalgar Road, Birkdale, Southport, Lancs., late managing director of Willie Glassberg and Sons Ltd., waterproof garment manufacturers, Manchester, who died on January 4 last, left £15,050 gross, £5,721 net value.

A £300 gold-plated dining room suite has been made by Dorice Tubular Furniture Ltd. All metal fittings, such as legs, chair backs and door handles have been plated with 22 carat gold. The table has been surfaced with Bakelite's Warerite Royale supplied by Decra Plastics of Walthamstow.

The Morgan Guaranty Trust Company of New York is preparing to sell BTR Industries ordinary shares 'over the counter.'

R·I·P·

CLASSIFIED ADVERTISEMENTS

Donald Leaver Limited

1 LONDON ROAD, STAINES, MIDDX. Phone STAINES 55271-2

For sale: 650 tons up/stroke hydraulic press accommodating platens 30in. x 24in. Ideal conversion multi daylight. (483)

MACHINERY FOR SALE

6d. a word, Minimum 12/6 Box 2/-

'COTSWOLD' dipping machines and circulating tanks for latex and PVC. New catalogues now available on request.—Lionel Hook and Sons, Ebley, Stroud, Glos. Tel.: Stonehouse 614/5. (380R)

FOR sale: Windsor 6oz. plastic injection moulding machine, 4-column horizontal type. Hydraulic operation, automatic temperature control.—Fred Watkins (Engineering) Ltd., Coleford, Glos. Phone Coleford 2271/5. (422)

BLACKFRIARS 24 x 12 rotary cutter with 20 h.p. motor and starter. One complete set of spare knives, together with pneumatic take-off equipment, vibratory screen and steel staging. The above comprehensive equipment is in excellent condition and is available immediately. Price complete £800. Ex works.—Box 359. (359)

BRIDGE Banbury No. 11 with 250 h.p. drive; Intermix K4 with 110 h.p. drive; Bridge Banbury No. 3A with 110 h.p. drive; three 40in. x 16in. double geared mills.—Reed Brothers (Engineering) Ltd., Replant Works, Woolwich Industrial Estate, London, S.E.18. Tel. Woolwich 7611 (6 lines). (475)

MAINS failure!!! Mains failure!!! Diesel generating plants for sale from 1¼kva to 100kva. Electric start or fully automatic. All plants in first-class condition and ready for immediate operation. State approximate output required.—Speed Electrics, Church Street, Basford, Nottingham. Tel. 75716. (465)

MANUFACTURERS of roughing machines for rubber sheeting, sponge rubber, splitting machines, leather cloth plant, embossing plates and rollers, spreading machines and presses.—G. L. Murphy Ltd., Imperial Works, Menston, Nr. Leeds. (238R)

MACHINERY FOR SALE
(continued)

STEAM-HEATED rubber vulcanizing oven, 4ft. dia. x 6ft. long, in first-class condition.—Box 358. (358)

TWIN roll mill, 36in. x 12in., complete with electrically operated boiler, in good condition Operated by 70 h.p. motor through geared reduction box. Recently completely overhauled.—Box 477. (477)

ARTICLES FOR SALE
6d. a word, Minimum 12/6 Box 2/-

CELLULOSE acetate sheet offcuts. Continuous strip in reels ⅛in. to 2in. wide approx. by .010in. thick. Several hundredweight various colours.—Box 480. (480)

MISCELLANEOUS
6d. a word, Minimum 12/6 Box 2/-

USE chlorinated paraffin K71 for economical self-extinguishing of Polyester/glass laminates. Regular supplies available from Chemicals Trading Company Ltd., Cree House, 18-20 Creechurch Lane, London, E.C.3. Tel. AVEnue 5488. (486)

PLEASE NOTE

INSTRUCTIONS FOR THE CLASSIFIED ADVERTISEMENTS MUST REACH US BY 10 A.M. WEDNESDAY MORNING OF EACH WEEK

Address Box Number replies to:
Box No.—, RUBBER JOURNAL AND INTERNATIONAL PLASTICS
Maclaren House, 131 Great Suffolk Street, London, S.E.1

APPOINTMENTS VACANT
6d. a word, Minimum 10/-. Box 2/-.

BRITISH Insulated Callender's Cables Limited, Helsby Works. A technical assistant is required for the Chemical Laboratory of the Wiring and General Cables Division. The laboratory is of modern design, well equipped and provides excellent working facilities. Applicants should have G.C.E. at "A" level in chemistry or O.N.C. as a minimum desirable qualification. Some industrial experience with gas chromatrography or spectrophotometry and an interest in plastics would be an advantage. Applicants should write stating age, qualifications and experience to the Works Personnel Officer, (1808) British Insulated Callender's Cables Limited, Helsby, via Warrington. (479)

COMPANY situated in Midlands requires Foreman for rapidly expanding extrusion department. Applicants must have sound knowledge of various types of rubber extrusions. Good salary.—Write stating age, experience, salary required to Box 454. (454)

OPPORTUNITY for two or three live and experienced mechanical sales representatives, London company, territories available Greater London, Midlands and Northern. Salary commensurate with experience, plus commission and expenses. Write in strict confidence—Box 467. (467)

THE Information Officer of a trade association requires a lady assistant who is interested in semi-technical work, has some knowledge of library procedure and can deal with telephone enquiries. An ability to type would be an added advantage. Apply in own handwriting, giving age, past and present positions and any other relevant details to the Natural Rubber Bureau, Market Buildings, Mark Lane, London, E.C.3., marking the envelope IS/ASST. (478)

APPOINTMENTS VACANT

Production Management

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require a Departmental Manager for the Heathhall Factory, Dumfries. This position would suit a man with an Engineering background who is interested in Production Management as applied to rubber processing operations, including calendering, spreading and continuous vulcanizing. The position is an interesting and important one which will be well remunerated. Five-day week, contributory superannuation scheme, free Life Assurance and assistance with removal expenses. Applications marked P.M. giving full details of age, experience and present salary should be addressed to Industrial Relations Division, The North British Rubber Co., P.O. Box 47, Castle Mills, Edinburgh, 3. (462)

Rotocures

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affiliated to

U.S. RUBBER OF AMERICA

require a Superintendent for the Rotocure department of the Heathhall Factory, Dumfries. Candidates for this key position must have had experience in the efficient operation of continuous vulcanizing equipment and the production of PVC and rubber belting, rubber flooring and matting. Experience of modern management techniques and a thorough knowledge of Rotocure equipment is essential. Five-day week, contributory superannuation scheme, free Life Assurance and assistance with removal expenses. Applications marked R giving full details of age, experience and present salary should be addressed to Industrial Relations Division, The North British Rubber Co., P.O. Box 47, Castle Mills, Edinburgh, 3. (463)

APPOINTMENTS WANTED

6d. a word, Minimum 10/-. Box 2/-.

EXECUTIVE, 43, REQUIRES SUITABLE POSITION where strong competitive experience over 13 years in overseas subsidiary of large international organisation covering compounding, production, testing and sales service of tyres, tubes, conveyor, elevator, transmission and vee belting, general mouldings, hose and chemical plant linings, can be utilised. Available immediately. Overseas and/or UK travel or continental residence would be considered.—Box 476. (476)

SALES representative (42), resident Manchester area, 20 years' experience footwear, mechanicals, unvulcanised compounds, seeks position. Good connections. Own car available.—Box 482. (482)

PRODUCTION manager desires change. Seven years' technical, five years' practical experience in compounding extruding, moulding rubber and plastics. Age 32.—Box 484. (484)

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